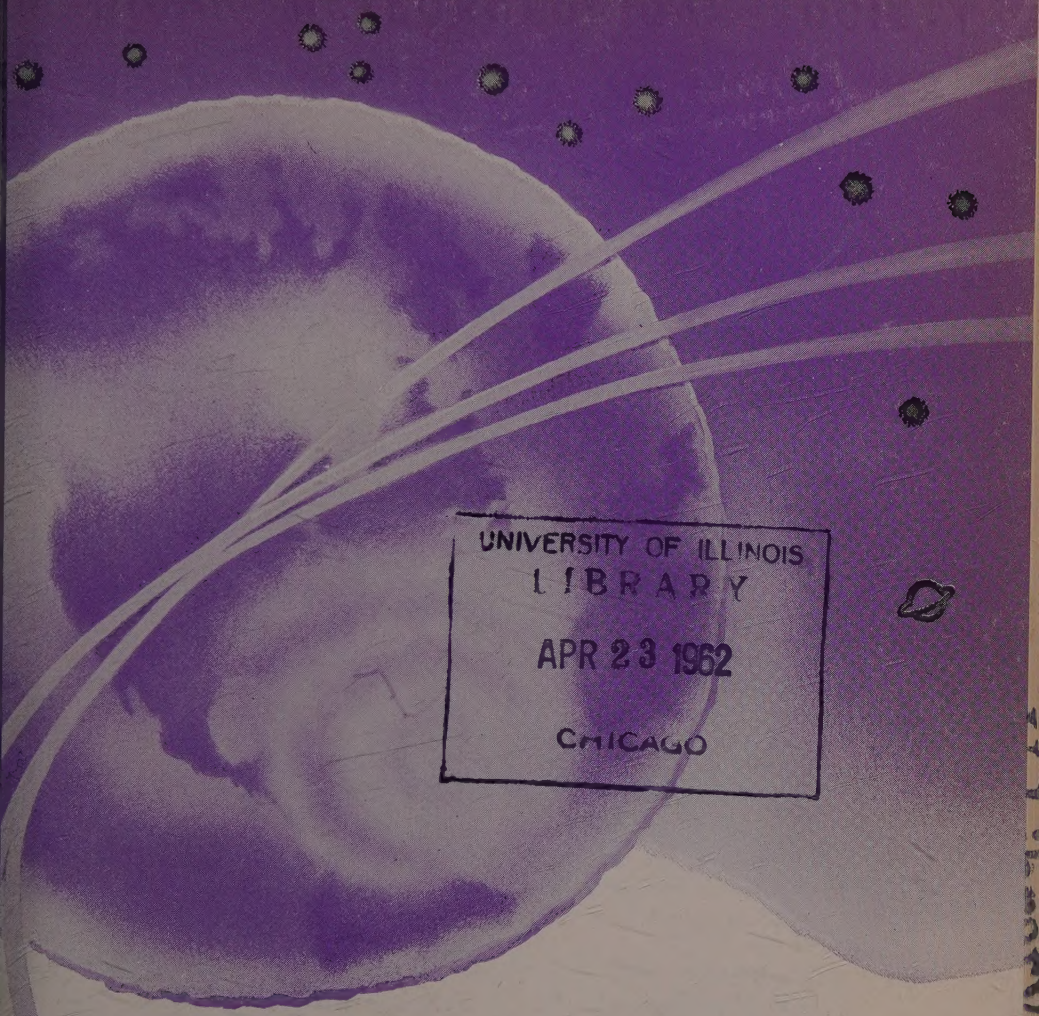
MERICAN METEOROLOGICAL SOCIETY



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METEOROLOGICAL AND GEOASTROPHYSICAL ABSTRACTS

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METEOROLOGICAL AND GEOASTROPHYSICAL ABSTRACTS

MALCOLM RIGBY, Editor

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Special Feature in This Issue

Annotated Bibliography on Planetary Atmospheres
3. Jovian Planets and the Moon

By

Andrew Meglis and Geza Thuronyi

(*For complete table of contents see back cover*)

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FOREWORD

Meteorological and Geoastrophysical Abstracts is a monthly publication devoted to current literature in meteorology, geophysics and astrophysics.

Part I contains abstracts of current literature in the fields of meteorology, etc.

Part II of each issue comprises an annotated bibliography of important references on a special subject. Bibliographies published in the successive issues were:

Vol. I, 1950

1. Atmos. Pollution 2. Aerobiology 3. Cloud Physics 4. Hail
5. Tornadoes 6. Volcanic Dust 7. Climat. Changes 8. Thunderstorms
9. Icing 10. Acoust. Propagation 11. Evaporation

Vol. II, 1951

1. Extended Forecast 2. Long Range Forecast. 3. Soil Temp. 4. Constants, etc.
5. Clim. of Near East 6. Clim. of Middle East 7. Special Winds 8. Radar Storm
9. Condensation Trails 10. Clim. of N. E. Africa 11. Mountain Met. Detect.

Vol. III, 1952

1. Clim. of N. W. Africa 2. Carbon Dioxide 3. Clim. of Argentina, etc. 4. Dew
5. Objective Forecast. 6. Stratus Forecast. 7. Urban Climatology 8. Clim. of C. Africa
9. Visibility 10. Glaze and Rime 11. Free Air Turbulence

Vol. IV, 1953

1. Turbulence Theory 2. Turbulent Diffusion 3. Frost 4. Clim. of Australia, etc.
5. High Level Winds 6. Winds in Stratosphere 7. Jet Stream 8. Radiation Bioclim.
9. Clim. of Pacific 10. Auroras 11. Sferics

Vol. V. 1954

1. Oceanog. Met. 2. Clim. of S. E. Asia 3. Auroral Physics 4. Tropopause
5. Balloons 6. Numerical Forecast. 7. Radiation Data 8. Vertical Motion
9. Clim. of Arctic 10. Industrial Met. 11. Wind Waves and Swell

Vol. VI, 1955

1. Bibliog. of Bibliog. 2. Texts & Monogr. Bibliogs. 3. Storm Surges
4. Ionospheric Prop. 5. Photochem.—Upper Atmos. 6. Cloud Physics
7. Radar Cloud Physics 8–9. Atmos. Nuclei 10. Weather Modification 11. Cooling Power

Vol. VII, 1956

1. Synoptic Met.-Arctic 2. Clim. of Enclosed Spaces 3. Cosmic Rays (–1952)
4. Cosmic Rays (1953–56) 5. Atmos. Radioactivity 6. Inversions
7. Snow Micromet. 8. Snow Micromet. (Suppl.) 9–11. Tropical Cyclones

Vol. VIII, 1957

1. Solar Weather Relations 2. Night Airglow 3. Forecasting Special Elements
4. Forest Micrometeorology 5. Hydromet. Forecasting 6. Numerical Forecast. (Suppl.)
7. Albedo 8. Meteors 9–10. Tropospheric Prop. 11. Medical Meteorology

Vol. IX, 1958

1. Radioastronomy 2. Solar Astrophysics 3. Radioactivity in Atmosphere
4. Waves and Currents 5. Physical Oceanog. 6. Dynamic & Phys. Oceanog.
7. Long Range Forecast. 8. Radar Met. 9. Cosmic Rays 10–11. Geomagnetism

Vol. X, 1959

1. Works of C. E. P. Brooks 2. Tornado Forecasting 3. Soil Moisture 4. Sferics
5–6. Ozone 7. Acoustic Waves 8. Evaporation Measurement
9. Evapotranspiration (–1955) 10. Evapotranspiration (1956–1959) 11. Evaporation

Vol. XI, 1960

1. Outstanding Reference Works 2. Outstanding Texts 3. Numerical Forecast. (Suppl.)
4. Ionospheric Physics 5. Ionospheric Propagation 6. Ionosphere
7. Forecast Verification 8. Radar Meteorology 9. Rocket Meteorology
10. Satellite Meteorology 11. Airglow

Bibliographies in preparation or published in Vol. XII

1. *Aurora* 4–6. *Upper Atmos. Structure* 9. *Planetary Atmospheres: General*
2. *Auroral Physics* 7. *Precipitation Chemistry* 10. *Planet. Atmos.: Mars, Venus & Saturn*
3. *Limnology* 8. *Upper Atmos. Humidity* 11. *Jovian Planets and Moon*

Part III contains a listing of translations and the contents of important publications. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes.

EXPLANATIONS

Location of material: For each entry, a symbol is given for at least one library where th material may be found. The Union List of Serials (Gregory) is the source of most of th symbols used. In some cases, where no symbol has been assigned to a library, one will b devised according to the principles of the Union List.

Library symbols used frequently may be found in the following list:

DA:	U. S. Dept. of Agriculture Library, Washington, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DGS:	U. S. Geological Survey Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DN-HO:	U. S. Navy Hydrographic Office Library, Suitland, Md.
DNLM:	U. S. National Library of Medicine, Washington, D. C.
DP:	U. S. Patent Office Library, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.

Other symbols:

*	before an entry indicates a good data source.
†	before an entry indicates a good bibliography.
§	before an entry indicates a synoptic case history study accompanied by chart

Geographic locations are in the English form rather than the form used locally, for exampl Moscow for Moskva.

Titles of articles or monographs are in the language of the original article unless otherwi stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet using a modific tion of the Library of Congress transliteration scheme.

Abbreviations:

Titles of periodicals are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months a abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Numb (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus entry will read as follows:

Meteorologische Rundschau, 2(5/6):146–151, May/Juné 1950.

This indicates that the article appeared in *Meteorologische Rundschau*, *Jahrgang* 2 (V 2), *Heft* 5/6 (No. 5/6), *pages* 146–151, May/June 1950.

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL GEOASTROPHYSICAL MATERIAL

A. GENERAL

1. COLLECTED WORKS

12.11–1 551.587(02)(08) 551.508.8(02)(08)

*†Hesse, Walter (*ed.*), **Handbuch der Aerologie.** [Handbook of aerology.] Leipzig, Geest & Portig, **1961.** 897 p. figs., tables, bibliogs., eqs. throughout. Author and subject indexes. (For listing of contents (articles abstracted separately) *see* 12(11):2339 Nov. 1961, *Met. Abs.*) **DWB (M87 H236ha)**—This is a long needed and handsomely executed compendium or reference work on the various classical and modern methods of aerological observation and research. It consists of 14 major articles reviewing the numerous facets of as many branches of aerology, grouped under the following six headings: 1) Historical development (Walter Hesse); 2) Thermodynamic bases and working methods (Fritz Möller and Kurt Bullrich); 3) Classical aerological methods—kites, captive balloons, etc. on land and sea (Paul Dubois and Edward Huss); 4) Recent aerological techniques—glider planes, airplane soundings, radiosondes, ozone measurements and rockets (W. Georgii, H. Berg, J. Rink, H.-K. Paetzold and E. Schvidkovski); 5) Aerological soundings—wind aloft observation, turbulence and atmospheric electric measurements (H. Müller, H. Lettau and H. Israël) and 6) Applications of aerological data to synoptic meteorology and to climatology, respectively (H. Reuter and H. Flohn). Appended are good author and subject indexes. Each chapter has a thorough outline of contents and there is a very extensive bibliography at the end. The book is filled with graphical and tabular material, charts, photographs of equipment and instruments, line drawings, cross-sections, etc. *Subject Headings:* **1. Aerology handbooks 2. Handbook of aerology 3. Aerological bibliographies 4. Aerological instruments.**—*M.R.*

12.11–2 551.581(213)(08)

Symposium on Man and Animals in the Tropics, Univ. of Queensland, 1956, **Symposium on Man and Animals in the Tropics, School of Physics, Univ. of Queensland, Brisbane, May 24–25, 1956.** [Brisbane, **1957**]. 234 p. figs., tables, refs. Mimeo. At head of t-p.: Australian Academy of Sciences. Pertinent articles (abstracted separately): Taylor, Griffith: **Introduction to tropical climatology,** p. 13–16; Ashton, H. T.: **Climatology of Australasian tropical areas,** p. 17–31; Albrecht, F. H. W.: **Radiation effects on men and animals in the tropics,** p. 32–39; Swinbank, W. C.: **The physical environment and its measurement: humidity,** p. 40–42; Macfarlane, W. V.: **Human function in the tropics,** p. 58–63; Damm, J. T.: **Psychological adjustments to life in the tropics,** p. 64–74; Cooper, A. G. S.: **Skin cancer,** p. 75–79; Moule, G. R.: **Impact of the physical environment upon sheep in tropical Queensland,** p. 85–90; Macfarlane, W. V.: **Water economy and heat tolerance of tropical Merino sheep,** p. 91–96; Willis, A. H.: **Prospects for direct utilization of solar energy,** p. 116–125; Murphy, J. A.: **Air conditioning in the tropics,** p. 126–131; Drysdale, J. W.: **Tropical housing,** p. 132–141; Langer, Karl: **Town planning for the tropics,** p. 142–147. **DLC** (QH543.S9 1956)—This publication contains the proceedings of the "Symposium." The papers were devoted to a study of the various aspects of the impact of the physical and biological environment on man and his domestic animals in the Australian tropics. The Symposium was held in four sessions. At the first session, four papers were read on the physical environment and its measurement. The second session included three papers on effects of the physical environment on man and four papers on the impact on domestic animals. Four papers read during the third session dealt with the utilization and control of physical environments. At the fourth session, seven papers were read and the topic covered was the biological environment and its impact. Each

session was followed by a lively discussion on the papers read by the participants. *Subje Headings:* **1. Tropical climatology symposia 2. Tropical climatic effects on man 3. Tropic climatic effects on animals 4. Climate of Australasian tropics 5. Australasia.**—*I.S.*

12.11–3 551.510.42(0

*†American Society for Testing Materials, **Symposium on air pollution control.** Presente at the Third Pacific Area National Meeting, A.S.T.M., San Francisco, Calif., Oct. 16, 195 Its *ASTM Special Technical Publication*, No. 281, **1960.** 44 p. figs., tables, refs. Pric $1.50. Pertinent articles (abstracted separately) are: Robinson, Elmer, **Air pollution potenti of California coastal climate,** p. 3–8. Moore, R. J.; Boscia, T. D. and Lundeen, R. W., **Wi and weather summaries for chemical plant design and air pollution control,** p. 9–14. Pac M. R.; Hill, A. C.; Thomas, M. D. and Transtrum, L. G., **Determination of gaseous a particulate inorganic fluorides in the atmosphere,** p. 27–44. **DWB** (M10.42 A512sym)—T occasion of a national ASTM meeting in San Francisco afforded an opportunity for a discussi of the special air pollution problems of the Bay area together with their relationships to t much-discussed Los Angeles smog and the other types of air pollution. The meteorology the Pacific Coast was described, showing the patterns of wind movement and temperatu inversions which are responsible for the accumulation of pollutants in the populated areas California. It was shown that there is nothing unique meteorologically about the Los Angel Basin that would make its air pollution potential different from other parts of the Californ coast. Therefore the actual pollution of each area is determined by its special topograp and the amount of urban and industrial pollutants emitted into the air. From this viewpoi the San Francisco Bay Region was considered in detail with relation to the principal industr areas, the cities and the Santa Clara valley. Finally, analytical methods for aldehydes a fluorides in the atmosphere were discussed. The latter discussion was concerned with t rather difficult but very important separation of gaseous and particulate fluorides. *Subj Headings:* **1. Atmospheric pollution symposia 2. Atmospheric pollution control 3. Californ** —*Author's abstract.*

12.11–4 551.501:551.578.4(08)(52) 551.322(08)(5

Japanese Society of Snow and Ice, Tokyo, **Review of study on snow and ice in Jap during recent years, 1950–1958.** *Researches on Snow and Ice*, Tokyo, No. 3, Sept. 19 139 p. (entire issue devoted to this subject). Title page, table of contents, titles of pap and bibliographic information in Japanese and English. **DWB** (M78.4 J35r)—A collect of reviews and summaries of research on snow and ice in Japan from 1950 through 19 A table of contents lists 24 papers as follows: **General review** by H. Hatakeyama; **Cryst of ice** by K. Higuchi; **Crystals of snow** by T. Kobayashi; **Snow fall phenomena** by C. Mago **Forecast of snow** by K. Ishihara; **Sea ice** by K. Kusumoki; **Frozen soil** by A. Higashi; **Freez of cell** by K. Aoki; **Snow storm and snow drift** by M. Shiotani and H. Arai; **Physical propert of deposited snow** by Z. Yosida; **Snow cover phenomena** by M. Shôda; **Snow survey** M. Onuma; **Snow melt** by C. Kojima; **Statistical data on snow** by H. Nakashima; **Agricult** by C. Kojima; **Forestry** by T. Takahashi; **Railways** by M. Shiotani; **Electric power by** Hattori; **Communication** by M. Shôda; **Construction** by M. Ifukube; **Architecture by** Yoshizaka and T. Fujkura; **Environment sanitation** by S. Oikawa; **Mountaineering by** Kanesaka; **Ski and sledge** by T. Ohnishi and **Economic relations** by M. Nakagawa. (similar report including research to 1949, *see* 7.1–3, Jan. 1956, *Met. Abs.*) *Subject Headi* **1. Snow and ice research 2. Japan.**—*E.Z.S.*

12.11–5 550.3:92

The Earth today: a collection of papers dedicated to Sir Harold Jeffreys by some of students and colleagues on the occasion of his 70th birthday. London, Royal Astronom Society, **1961.** 404 p. figs. (incl. photos), port., tables, refs., eqs. Price: **$12.00.** issued as Vol. 4, of *Geophysical Journal*, London. (For listing of contents (abstracted arately), *see* 12(7):1511, July 1961, *Met. Abs.*) **DWB, DLC**—The 27 papers in this vol represent some of the advanced research in fields of geophysics which are or were of inte to SIR HAROLD during the past half century. The subjects include atmosphere and oce

nteraction (2), composition of Earth's core (3), gravity (5), geodesy free oscillations (3), nstruments (2), seismology (body (5) and surface (4) waves) (9), and geothermy (3). The dvances in these fields since the first edition of JEFFREY'S classic text **The Earth** was published n 1924, have been tremendous and many of them are mentioned in the introductory sketch f **The Earth today** on p. vii–viii, and in the tribute to SIR HAROLD by R. STONELY on p. ix–xi. His work in meteorology in the Meteorological Office under SIR NAPIER SHAW, especially hat on monsoons and the general circulation, seiches, wind waves in water, convective cells, egun during the First World War, is of particular interest. Since then his main contributions ave been on the interior of the Earth and seismology, and on application of statistical rather han graphical methods to geophysics. He recently received the Copley Medal of the Royal ociety. *Subject Headings:* **1. Memorial volumes 2. Geophysics compendia 3. Biography f Sir Harold Jeffreys 4. Jeffreys, Sir Harold.**—*M.R.*

12.11–6 629.19:533.6:061.3

Conference on Physical Chemistry in Aerodynamics and Space Flight, Univ. of Pennylvania, Sept. 1–3, 1959, **Proceedings.** Pub. in *Planetary and Space Science*, London, Vol. 3, 1961. 288 p. figs., tables, refs., eqs. (For articles of interest (abstracted separately), *see* 2(8):1715–1716, Aug. 1961, *Met. Abs.* under title of journal, *Planetary and Space Science.*) **DWB**—A collection of papers presented at the Conference on Physical Chemistry in Aerodynamics and Space Flight. Thirteen papers were included in the section which considered urface and solid phase reactions; eight papers were included in the section which considered as phase reactions and kinetics; eight papers considered experimental methods and simulation nd ten papers considered the thermodynamic and transport properties of gases. The interisciplinary nature of the Conference and the development of a new regime of application of hysical chemistry were pointed out. The new regime might well be called the physical hemistry of aerodynamic processes. *Subject Headings:* **1. Physical chemistry of aerodynamic rocesses 2. Conference on Physical Chemistry in Aerodynamics and Space Flight, Univ. f Pennsylvania, Sept. 1–3, 1959 3. Space flight conferences.**—*E.Z.S.* Ⓢ

12.11–7 551.46:061.3

International Union of Geodesy and Geophysics. Association of Physical Oceanography, oronto, Sept. 1957, **Procès-Verbaux** No. 7, pub. Göteborg, **1960.** 293 p. Sec. E, **National nd Institutional Reports.** Sec. F, **Symposium on the Water Balance of the Earth.** Sec. G, **ymposium on the General Circulation of the Ocean, with particular emphasis on Deep Water ovements.** Sec. H, **Symposium on the Construction of Cotidal Charts.** (Pertinent papers rom these sections abstracted separately.) **DWB**—The Proceedings of the Eleventh General ssembly of the Assoc. of Physical Oceanog. Sept. 3–14, 1957 included, in addition to routine usiness, the reports of committees, national and institutional reports and the three symposia. he papers are divided into 3 sections: transfer of momentum from the air to the sea, currents nd tidal streams near the bottom in coastal waters and estuaries and miscellaneous. *Subject eadings:* **1. Oceanographic conferences 2. IUGG. Association of Physical Oceanography eetings 3. Toronto, Canada.**—*O.T.*

A2. TEXTBOOKS AND TECHNICAL BOOKS

See also: **History of U. S. Weather Bureau** (Whitnah), 12.11–24; **Introduction to climat.** (Scherhag), 12.11–31.

12.11–8 551.5(02) 550.3(02)

†Oboleńskiĭ, Vladimir Nikolaevich, **Kurs meteorologii dlia vysshikh uchebnykh zavedenii.** [Textbook on meteorology for higher schools.] Moscow, Gidrometeoizdat, **1944.** 684 p. 07 figs., tables, bibliog. p. 682–684. **DLC** (QC861.02)—Meteorological elements and atmospheric phenomena are described with graphic illustrations in relation to hydrology, seismology, earth magnetism and other geophysical sciences. The meteorological processes reflecting the weather conditions over large geographic territories and weather forecasting ervice are described in a special chapter (XI) on synoptic meteorology (with maps).

General considerations and mathematical formulas of dynamic and thermodynamic meteo ology are used to express air movements in the atmosphere. Two chapters (XIII, XIV) a related to atmospheric optics, with special attention to: dispersion, reflection and refracti of light in the atmosphere and their measurement. Acoustical and electrical phenomena a described in the last two chapters with an analysis of the ionization of atmosphere and outline of theory and measurement of radio activity in the atmosphere, in water and on lan *Subject Headings:* **1. Meteorology textbooks 2. Geophysics textbooks.**—*N.P.S.*

12.11–9 551.5:63(02) 551.582.1(497

*†Kiriakov, Kiril P. and Todorov, T., **Meteorologiia i klimatologiia s osnovi na selskostopa skata meteorologiia.** [Meteorology and climatology with elements of agricultural mete ology.] Sofia, D'rzh. Izd-vo sa Selskostopanska Lit-ra, **1959.** 259 p. 44 figs., 27 tabl 79 refs. At head of t-p.: Universitetska Literatura. **DLC** (QC861.K559)—A textbook basic meteorology and climatology for students of agriculture, forestry or geography in B garian universities or technical schools. The first part contains 14 chapters on general m teorology (the atmosphere, solar radiation, soil and air temperature, humidity, evaporati condensation, haze, clouds, fog precipitation, wind and weather). Pt. II covers climate, t elements of climate, the climate of Bulgaria and climatic regions of Bulgaria in 3 chapte The third major part contains 7 chapters on agrometeorology and agroclimatology, mic climate, artificial influences on climate, effect of radiation, moisture, soil moisture and wi on growth of crops and plants, phenology, harmful effects of weather and climate, agrocli tology and, finally, agrometeorological service (forecasts and use of data). *Subject Headin* **1. Meteorology textbooks 2. Climate of Bulgaria 3. Agrometeorology 4. Bulgaria.**—*M.*

12.11–10 551.58(

†*Mo, Chen-sheng (*Met. Dept., Nanking Univ.*), **Principles of climatology.** Peking, 19 510 p. 199 figs., 235 tables, 40 refs., eqs. In Chinese. Title romanized: **Ch'i hou hsu yüan li. DWB** (M8 M687 pr)—This is a mathematical—statistical—climatology textbo designed for the Meteorology Dept. of Nanking University in 1958. The contents consist 23 chapters in 6 parts. Pt. 1–3 deal with analytical meteorology, of which Pt. 1 discus radiation factors and their influence on climatic conditions; Pt. 2, the general atmosph factors in relation to climatology and Pt. 3, the relationship between geographical factors a climatology; Pt. 4 is concerned with synoptical meteorology, and describes various meth of classification of weather types, climate distribution and natural phenomena; Pt. 5 tre of the history of past climate and meteorology, from the glacial epoch to the present; P deals with local and micrometeorology and is divided into many sections, such as curre evaporation, soil and heat exchange between atmosphere and water surface, orography peculiar local climate. The general character of this textbook is influenced by the follow facts: first, although highly technical, it excludes many recent scientific developments; seco the arrangement and contents follow the Russian textbook written by ALISOV, DROZDOV RUBINSHTEIN, though much is cited from western texts, such as HANN-KNOCH's **Handboo climatology,** and from classic articles in German and American journals. *Subject Head* **1. Climatology textbooks.**—*K.C.*

12.11–11 551.4(02) 551.582.1(5–

†Cressey, George Babcock (*Prof. Geog., Syracuse Univ.*), **Crossroads: land and lif Southwest Asia.** N. Y., Lippincott, **1960.** 593 p. numerous figs and photos. Bibliog end of each ch. tables. (*Lippincott Geography Series.*) Price: $12.00. **DLC, DWB** (9 C922cr)—A handsomely illustrated and nicely bound textbook on the economic, human physical geography (climate, rivers, land use, resources, etc.) of the Near or Middle E Turkey, Arabia, Egypt, Iraq, the Levant, Israel, Iran and Afghanistan. The most impor element in climate is water (or the lack of it) so water figures heavily in all of the chap The chapter on climate (p. 93–117), includes a discussion of the Mediterranean type cli of the region, pressure and air masses, local winds, temperature, precipitation, water bal and climatic regions, and some tabular data for 37 representative stations. Each chapte the separate regions named above also contains an extensive section on climate with climog

for a number of stations within the country or area. The climograms show the extremes of temperature and the monthly potential evapotranspiration as well as the means and daily range of temperature and average monthly precipitation. *Subject Headings:* **1. Climate of Near East 2. Climatic regions of Near East 3. Geography textbooks 4. Near East.**—*M.R.*

12.11–12 551.593(02) 551.501.7:551.508.762

*†Rozenberg, Georgiĭ Vladimirovich (*ed.*), **Prozhektornyĭ luch v atmosfere; issledovaniia po atmosfernoĭ optike,** by Iu. S. Georgievskiĭ et al. [Searchlight beams in the atmosphere; research on atmospheric optics.] Moscow, Akademiia Nauk SSSR, **1960.** 243 p. 152 figs., 34 tables, 173 refs., eqs. At head of t.p.: Akademiia Nauk SSSR. Institut Fiziki Atmosfery. **DLC** (QC975.R6), **DWB** (M93 G352pr)—Dispersion and absorption of light in the atmosphere are affected by the optical conditions of the atmosphere which vary with altitude and meteorological conditions. The character of light dispersion in the atmosphere can be used as the indicator of its optical conditions and of atmospheric processes which are responsible for these variations. Therefore, modification of characteristics of the searchlight beam can be used for the study and sounding of optical properties of the atmosphere at different altitudes and under different conditions. Theoretical and experimental investigations conducted by the authors in the Laboratory of Atmospheric Optics of the Institute of Atmospheric Physics of the Academy of Sciences of the U.S.S.R. are described with tabulated data, graphs, records, photographs and other illustrations. The work of these investigators is grouped under the following six major topics: (1) forecasting problems on visibility and sounding of atmosphere with the searchlight beam; (2) optical properties of atmosphere; (3) structure and characteristics of the searchlight beam; (4) approximate theory of visibility and theory of atmospheric sounding; (5) qualitative analysis of intensity of a dispersed light beam and (6) experimental verification of theory of atmospheric sounding. *Subject Headings:* **1. Atmospheric optics textbooks 2. Searchlight techniques 3. Upper air sounding by optical methods. I. Georgievskiĭ, Iu. S. II. Driving, A. Ia. III. Zolotavina, N. V. IV. Feĭgel'son, E. M. V. Khazanov, V. S.**—*N.P.S.* Ⓢ

12.11–13 551.556.4:553.621 551.556.4:551.578.46

†Bagnold, Ralph Alger, **Physics of blown sand and desert dunes.** 2d ed. Methuen, London, **1954.** 265 p. 84 figs., 16 plates, refs., eqs. "First ed. 1941." **DLC** (QE597.B3 1954)—This book is mainly concerned with the movement of sand over a flat or nearly flat surface. It considers why sand collects into dunes and how dunes assume and maintain their shapes. The work is based on facts discovered during wind-tunnel experiments carried out in 1935 and 1936 and on subsequent verifications made in the Libyan Desert in 1938. Though the work is mainly concerned with sand, much of it can be applied equally well to dry granular snow. Sand movement in water is also considered. The physics of grain movement is treated in the eight chapters of the first part of the book. Wind tunnel observations are discussed in Ch. 3; surface wind effects (measurements, drag, surface roughness, wind gradients, turbulence, etc.) in Ch. 4. The effect of sand movement on the velocity distribution of surface wind under different conditions of grain size, different surfaces, wind gradient, etc., is considered quantitatively in Ch. 5. Small scale effects are treated in Pt. II and large scale effects in Pt. III. Singing sands on the sea shore and on the slip-faces of desert dunes and drifts are compared in the final chapter. *Subject Headings:* **1. Sand transport by wind 2. Snow transport by wind 3. Geomorphology.**—*E.Z.S.*

12.11–14 536(02)

Roberts, J. K., **Heat and thermodynamics.** 5th ed. rev. by A. R. Miller. N. Y., Interscience Pub., Inc., **1960.** 619 p. numerous figs., tables, foot-refs., eqs. **DWB**—A textbook for the use of students taking a university honors course in physics. Revisions in the methods used to define the size of the degree are indicated. The definition in terms of a single fixed point is used in speaking of the thermodynamic scale, while that in terms of a temperature interval is used in considering the international scale, the interpolation instruments are used to realize it, and the particular gas thermometers by use of which these interpolation instruments are calibrated. The book contains an additional list of engineering texts including

recent work on the principle of corresponding states, on magnetic cooling, and on the Buns ice calorimeter. The subjects included are temperature, heat, kinetic theory of gases, equati of state for gases, specific heats of solids and liquids, vaporization, fusion, thermal expansic heat transfer, thermodynamics, power cycles, entropy, equilibrium of physical and chemi systems, radiation and equation of state for solids. *Subject Headings:* **1. Physics textboo 2. Thermodynamics textbooks 3. Heat textbooks.**—*E.Z.S.*

12.11–15 52(02) 523.

†Fielder, Gilbert, **Structure of the Moon's surface.** London, Pergamon Press, **19** 266 p. figs., tables, refs. at end of each ch., eqs. Price: $7.50. **DLC** (QB591.F5)—A detail study of the nature and origin of a variety of topographic features on the Moon's surface bas on a considerable amount of observational data compiled by the author. The first part of t book sets forth a number of physical problems: the librations of the Moon, height determi tions of points on the Moon's surface, the figure of the Moon, the luminous intensity a luminescence of the lunar rocks, the color of moonlight and the composition of the Moo surface, polarization of light reflected by the Moon, temperature of the Moon, the Moo atmosphere, and the probable nature of the Moon's surface. The second part of the bo contains descriptions and analyses of ray systems, grid systems and lattice patterns, rill faults and wrinkle ridges, craters and maria. The final chapter summarizes conditions relat to the origin of the Moon's surface structure. Considering the figure of the Moon it is s gested that the Moon is probably not a homogeneous ellipsoid in a state of hydrostatic eq librium. The whole grid system appears to have been formed by compressional forces a these forces appear to have arisen as a consequence of the slow adjustment of the Moo figure to assume a form of minimum potential. *Subject Headings:* **1. Moon's surface struct 2. Astronomy textbooks.**—*E.Z.S.* Ⓢ

12.11–16 551 529:55

Gamow, George, **Biography of the Earth: its past, present, and future.** N. Y., Vik Press, **1959.** 242 p. 58 figs., 27 illus. First pub. 1941. Price: 35 sh. **DLC** (QE501.0 1959)—A pocket-sized book which explains in simple terms the complex theories and fa about the origin and history of the Earth, the Moon, the planets and the solar system. explains current ideas on the rise and fall of mountains, the evolution of continents, the clima of the past, the origin of life on earth and elsewhere in the solar system. The author poi out that it now seems certain that at least one percent of the hundred billion stars forming stellar system of the Milky Way possess planets not much different from those revolv around our sun. Recent developments in studies of the origin of life make it almost cert that some kind of life, probably not much different from our own, may exist in the milli of other inhabitable worlds. In the concluding chapter, the author predicts continued tecto activity, the next glacial period, the fate of the Earth, the Moon and the Sun. A chronolog chart summarizes the most important events of the Earth's past and future evolution. *Sub Headings:* **1. Geology 2. Geochronology.**—*E.Z.S.*

12.11–17 522

Miczaika, Gerhard Robert and Sinton, William M., **Tools of the astronomer.** Cambri Mass., Harvard Univ. Press, **1961.** 294 p. 195 figs., 4 tables. Price: $7.75. L (QB86.M5). Review by Armin J. Deutsch, *Science,* Wash., D. C., 133(3462):1416, Ma **1961. DLC**—A text which describes instruments and techniques employed in astronom research. Instruments which have had a long history in astronomical observations, the vi refractor, the bifilar micrometer, the meridian circle as well as the equipment of the mo solar observatory and of radio astronomy are described. Photographs and diagrams sup ment the text. An introductory chapter on the nature of light furnishes a foundation the reader who might wish to review the fundamentals of optics. Subsequent chapters with photography, telescope optics, construction of telescopes, photometry, spectroscopy struments for solar research such as tower telescopes, high-dispersion spectrographs, spectroheliograph, the polarizing monochromator, the coronagraph, the solar magnetog and radio telescopes. *Subject Heading:* **1. Astronomical instrument textbooks.**—*E.Z.S.* Ⓢ

12.11–18 551.579.5(02)

*†Rode, Alexeĭ A., **Das Wasser im Boden.** [Soil moisture.] Berlin, Akademie-Verlag, 1959. 464 p. 108 figs., 143 tables, 357 refs., eqs. Price: DM 56. **DLC** (S594.R615). Transl. of original Russian, **Pochvennaia vlaga.** Moscow, ANSSSR, **1952.** 456 p. (*see* 60C–97, March 1959, *Met. Abs.*). **DLC.** Review by N. Kingo Jacobsen in *Geografisk Tidsskrift,* 59:303, **1960.**—A good German translation of a large systematic text which deals in detail with many aspects of the study of water in the soil. An explanation of soil porosity is followed by a discussion of water, its properties and behavior under a variety of conditions. Water in its various forms are treated separately. The water holding capacity of various types of soils (sandy, clay), the soil capacity itself, the relationships between soil, water and plants and, finally, a classification of soil water forms is presented. The extensive bibliography contains 234 references to Russian literature and 123 to "international" literature. Much data are presented in graphs and tables, based on laboratory or field measurements of soil, moisture and plants. *Subject Headings:* **1. Soil moisture textbooks 2. Soil moisture bibliographies.**—*E.Z.S.*

12.11–19 551.482(47)

*†Kuzin, P. S., **Klassifikatsiia rek i gidrologicheskoe raĭonirovanie SSSR.** [Classification of rivers and hydrological regionalization of the U.S.S.R.] Leningrad, Gidrometeoizdat, 1960. 454 p. 77 figs. (incl. fold. maps), 38 tables+tables in appendix, bibliog, p. 383–392. Tit head of t-p.: Gosudarstvennyĭ Ordena Trudovogo Krasnogo Znameni Gidrologicheskiĭ Institut. **DWB** (M79 K97pL)—A substantial book presenting in 4 major parts (10 chapters) the basic principles of river basin classification with special application to the plains and mountain areas of the U.S.S.R. In the first part, the general rules for geographical classification applied to hydrology, the six major classifications established in Russia (Rodevich, Grigievsky, L'vovich, Zaĭkov, Sokolovsky and Isachenko), and the 11 Russian systems of hydrological regionalization are discussed. Pt. II goes into the classification of the rivers of the U.S.S.R. according to various parameters, Pt. III deals with hydrological "regionalization" of the U.S.S.R. and Pt. IV, characteristics of the various hydrological regions of the U.S.S.R.: the 6 plains regions and the 11 mountain regions. The work contains a great deal of data in tables, charts, graphs, etc. An appendix (60 pages) gives the elements of the water and ice regime of the rivers of the U.S.S.R. by basins. The bibliography contains 240 references to Russian works and 13 to non-Russian. *Subject Headings:* **1. Hydrologic classification 2. Hydrology of U.S.S.R. 3. U.S.S.R.**—*M.R.*

12.11–20 551.509.33(02)(47)

§†Egorova, Valentsina Ivanovna, **Metod kompleksnogo prognoza pogody na 10-dnevnye periody.** [Complex methods of weather forecasting for 10-day periods.] Leningrad, Gidrometeorologicheskoe Izdatel'stvo, **1960.** 78 p. 12 figs., 8 tables, 57 refs., eq. At head of t-p.: Glavnoe Upravlenie Gidrometeorologicheskoĭ Sluzhby Pri Sovete Ministrov SSSR, Glavnaia Geofizicheskaia Observatoriia. **DWB** (M09.3 E31me)—The author develops a method for making 10-day weather forecasts (wind velocity and direction and atmospheric temperature) for the Kara Sea on the basis of the development of elementary synoptic processes within the basic forms of atmospheric circulation (W—western, C—meridional, E—eastern) developed by G. Ia. Vangengeim, and with the aid of an additional form of atmospheric circulation—the transitional meridional circulation. The elementary synoptic process is defined as that interval of time in which the direction of the fundamental transports of warm and cold air are retained and the geographic distribution of the signs of the pressure field is conserved. The contents of this monograph comprise the following: the synoptic climatic characteristics of the Kara Sea including the influence of topography upon climate, characteristics of the atmospheric pressure and wind regime and the thermal characteristics of the climate; the development of the concept of elementary synoptic process and its characteristics; the characteristics of the fundamental forms of the circulation in August and September and the nature of the initial processes for forecasting, namely: the dynamic properties of the westerly, meridional, transitional meridional and easterly circulation forms and the dynamic properties of type circulation processes of the western, meridional (Northern Lapland, Northern Dvina, etc.), transitional

meridional and easterly types; the reliability of the method and an outline of the method forecasting synoptic processes and weather. The circulation types are illustrated by mea of synoptic maps and extensive data are presented in an appendix on the frequency of prevail wind directions within the boundaries of quarters of the horizon, the characteristics of the me decadal maximum and minimum atmospheric temperature at 7 hours, absolute values atmospheric temperature in the Kara Sea region; reliability of the forecasts of atmosphe temperature (climatological and by the method presented) for different forecast errors, forec values of mean decadal atmospheric temperatures of particular types of synoptic proces and their probability, etc. *Subject Headings:* **1. Extended weather forecasting 2. 10-d forecasting methods 3. Kara Sea, U.S.S.R.**—*I.L.D.*

A3. MONOGRAPHS

See also: **Soil moisture** (Rode), 12.11–18; **Way of the weather** (Spar), 12.11–38; **Dynamic study of stratos. polar vortex** (Boville), 12.11–47; **Urban and seasonal influence on mortality, Paris** (du Mesnil du Buisson), 12.11–93; **Wind and temp. fields of upper tropos. and lower stratos.** (Chiu), 12.11–301; **Theory of two-dimensional mountain waves** (Palm, Foldvik), 12.11–309; **Evap. from Lake Eucumbene, Australia** (Webb), 12.11–320; **Horiz. and vert. distribution of veg., Himalayas** (Schweinfurth), 12.11–365; **Houses for Australian climates** (Drysdale), 12.11–367.

12.11–21 551.506.1:551.48(05)(43

*Hungary. Vízgazdálkodási Tudományos Kutató Intézet. Vízrajzi Osztály, **Vízr Évkönyv, Vol. 63, 1958.** [Hydrographic Yearbook, Vol. 63, 1958.] Budapest, **1960.** 29 figs., numerous charts (some fold., some col.) and tables. Hungarian, Russian, French German summaries p. vi–viii. **DLC**—This elaborate volume, similar to those for previ years, contains detailed data for 245 first order river stations and 92 second order ga Mean daily data are given for 27 gages in addition to the daily morning readings. A sec on subterranean waters gives data for 987 measuring points on 520 streams. The mete logical section (p. 237–287) gives details of weather month by month, colored charts of seas and crop growing, season precipitation and departure from normal (40 year) in percenta daily precipitation for 20 stations in graphical form, tables of precipitation data for 677 stati temperature data of several types (5-day, cumulative, and mean), soil temperature d snow depth, sunshine duration (16 stations), evaporation (16 stations) and evaporation fi free water surface (3 stations) plus a map of evaporation. An elaborate colored sta location chart shows location of 3 types of stations (river, soil moisture and precipitati shown in tables. *Subject Headings:* **1. Hydrologic yearbooks 2. Annual meteorological summaries 3. Evaporation data 4. Hungary.**—*M.R.*

12.11–22 551.5:550.3(058)(436) 551.506.1(

*Austria. Zentralanstalt für Meteorologie und Geodynamik, Vienna. **Jahrbuch** [Y book], Vol. 96 (Old Ser., Vol. 104), 1959, issued **1960.** Each section separately paged. pendices, numerous tables. p. xiii-xiv, **Scientific publications of staff members, 1959.** *Pub.*, No. 174.) (For abstract on 1956 and 1957 issues, *see* 10.3–125, March 1959, *Met. A* **DWB, DLC**—This official yearbook for 1959 consists entirely of tabulated data with explanatory introductory notes. Sec. I contains daily weather observations taken in parts of the country; Sec. II, monthly and yearly or annual meteorological observati Sec. III, evaluations of self recorded and other summaries; sec. IV, phenological observat and a weather calendar for 1959; Sec. V, seismological observations and Sec. VI, magn observations taken at the Geophysical Observatory of Kobenzl. *Subject Headings:* **1. Me ology yearbooks 2. Annual meteorological data summaries 3. Geodynamic yearb 4. Seismological data 5. Magnetic data 6. Austria.**—*E.Z.S.*

12.11–23 551.579.5

*†Reeder, H. O. et al., **Ground-water levels in New Mexico, 1956.** *New Mexico. Engineer, Technical Report*, No. 19, **1960.** 251 p. 19 figs., 52 tables, bibliog. p. 249–2 The annual measurements of water level in the observation wells in various areas in

exico in Jan. or Feb. 1957 with changes in water level in 1956 are tabulated in this report, d the seasonal and daily measurements in 1956, are included. Water level changes for 1956 e discussed and presented graphically on maps for each area of observation. Other data, ch as irrigation and precipitation, are referred to. The scope of the program of water level easurements and the significance of the data are explained. The areas include the High ains, Pecos River Valley, South Central Closed Basin, Rio Grande Valley and southwestern ew Mexico. It is noted that precipitation was less in 1956 throughout New Mexico than any other year in the 65 years of recorded weather. In addition, a long period of below rmal precipitation preceded 1956, resulting in a drought worse than any in the last 50 yrs. 1956 about 1,320,000 acre-feet of ground water was pumped for irrigation. Water levels ntinued to decline in 1956 in areas where ground water is used for irrigation. In general, clines were smaller than in 1955 in Animas Valley, Nimbres Valley and Lea County and lout the same or greater in the other areas of observation of water levels. Water levels ached record lows in most observation wells in New Mexico except in parts of the Roswell sin and parts of the Carlsbad area. *Subject Headings:* **1. Ground water level data Drought, New Mexico, (1956) 3. New Mexico.**—*E.Z.S.*

12.11–24 551.5:061.1(73)(09)

†Whitnah, Donald R., **History of the United States Weather Bureau.** Urbana, Univ. of inois Press, **1961.** 267 p. Numerous foot-refs., bibliog, p. 241–249. **DWB** (M(09)(616hi). Review in *Meteorological Magazine*, London, 90(1467), June **1961.** Review in *Royal Met. Soc., Quarterly Journal*, 87(3), July **1961.**—The history of the United States Weather reau since its foundation under the United States Signal Service by COLONEL (later General) FRED J. MYER in 1870, is so intimately tied in with the history of meteorology in the United ates and throughout the world that a documentary book such as this gives a deeper insight o the scientific as well as political or bureaucratic developments of a century of organized teorology. The author gives hundreds of accurate citations, not only to published literature t to government documents and manuscripts and to newspaper articles. A chapter is voted to the development of networks and services of various types in the U. S. prior to 70 and to attempts by M. F. MAURY, A. JOSEPH HENRY of the Smithsonian, INCREASE PHAM, CLEVELAND ABBE, G. P. ESPY and others to organize or establish a National Weather rvice, and to the efforts which finally proved successful. Another chapter goes into the tus of scientific as well as organized meteorology under the United States Signal Service, other to the transition from military to civilian control and the scandals that helped bring s transfer about. The expansion of services which followed the post-transfer period (1891–) is covered in a revealing chapter on the Weather Bureau under WILLIS L. MOORE (1895–13), and one on the development of research in this same period. The upheaval attending e dismissal of MOORE in 1913 is a worthy subject for a chapter; the period of slow moderniza- n of the general service and of the rapid growth of the airways service (1913–41) are covered the next two chapters. World War II and the explosive growth of certain new services the post-war era is covered in the final chapter on the 1941–60 era under F. W. REICHELDER- R. The book has an excellent bibliography of published and unpublished documents and a od combined author and subject index. The international activities of the Bureau are not glected, although the main stress is placed on the organizational (governmental and service) tivities of and within the United States Weather Bureau. The book is an extension of a octoral thesis in history written by a graduate student at the University of Illinois and not r someone who has served in the United States Weather Bureau or who has had close contact th the Bureau from outside. It is well worth reading and probably worth doing again from different point of view. *Subject Headings:* **1. History of United States Weather Bureau U. S. Weather Bureau.**—*M.R.*

12.11–25 551.585.7:581.9(515)

†Wissmann, Hermann von, **Stufen und Gürtel der Vegetation und des Klimas in Hochasien d seinen Randgebieten. B. Thermische Raumgliederung (1. Teil) und Frostboden.** [Ver- al and horizontal zones of vegetation and of climate in Tibet and its surroundings. B. Ther- l zonation (Pt. 1) and frozen ground.] *Erdkunde*, Bonn, 15(1):19–44, March **1961.** 7 figs.,

table, 75 foot-refs., bibliog. p. 41–44. English summary p. 19–21. **DLC**—The thern vegetational borders of the zone between the snow line and the upper timber line down to t subalpine zone were examined. The snow line is about 1300 ft lower in shaded than in southe exposures, remaining in a mean vertical distance of about 3300 ft to the timber line of co paratively small range of exposure as shown by maps and a list. The highest forest in t world, with the timber line at 15,400 ft, is in eastern Tibet. The alpine zone between timb line and snow line is situated near the isotherm of 8°C of the warmest month at about 15,8 feet. The snow line, situated near the summer isotherms of +5° and +6°C, is found in t dry interior where forests are exposed to the north. The most extensive area of solifluct is in the humid upper part of the Alpine (subnival) zone of northern Tibet as shown on t map and profile. Dunes interpersed with the soils of free solifluction are formed in the c winter. They show similarity to the loess deposits of the ice age of Central Europe. S fluction and cryoturbation processes reach down below the timber line in all areas north of Bayen Kara Mountains. The combination of a strong annual frost-thaw cycle and diur frost thaw cycles in the dryer parts of Central Asia result in some interference in the devel ment of miniature and large size cryoturbation polygons and of solifluction stripe. Stro differences between the forest vegetation in the zone just below the timberline were fou i.e. between an outer belt with higher precipitation and lower temperature and an inner b with the values reversed. The forest types of the subalpine zone along the timberline described. An extensive region with humid forest types restricted to the northern slopes, shown on the maps, is represented by a innermost type area in eastern Tibet, in south a southeast by the inner belt type. The outer and inner belts south and east of Tibet similar to the forests of the marginal parts of the Alps. *Subject Headings:* **1. Vegetation zo of Tibet 2. Climatic zones of Tibet 3. Solifluction 4. Tibet.**—*O.T.*

12.11–26 551.582.2(4

*†Czechoslovakia. Hydrometeorologický Ústav, **Klimatické pomery Hurbanova.** [C matic conditions at Hurbanovo.] Ed. by Štefan Petrovič. Prague, **1960.** 278 p. numer figs., tables, refs. Added table of contents and list of legends of tables and figs. in Russ and in German. **DWB** (M82.1/437 G998kL)—An elegant presentation of all of the availa climatic data in extensive form with elaborate analysis of results. Direct solar radiati global radiation, air temperature, soil temperature, humidity, evaporation, precipitation, ra days, snow, cloudiness, sunshine duration, pressure, wind, soil conditions, phenology and o elements are considered in separate chapters. Hurbanovo is the oldest official weather sta in Slovakia and the only station with unbroken records since 1890. A total of 199 tables 79 figures (graphs) and numerous references (at end of each chapter) are included. history of the station, founded in 1867, is recounted and the exposure of equipment sh photographically in the first chapter. *Subject Headings:* **1. Climate of Hurbanovo, Cze slovakia 2. Statistical climatic analyses 3. Long period records 4. Hurbanovo, Cze slovakia. I. Petrovič, Štefan** (*ed.*).—*M.R.*

12.11–27 551.509.326:551.515.4:551.43(

†§Guniia, S. U., **Grozovye protsessy v usloviiakh Zakavkaz'ia.** [Thunderstorm proce in Transcaucasia.] Leningrad, Gidrometeoizdat., **1960.** 155 p. 28 figs., 37+5 tables refs., numerous eqs. At head of t.p.: Glavnoe Upravlenie Gidrometeorologicheskoĭ Sluz pri Sovete Minstrov SSSR. Tbilisskiĭ Nauchno-Issledovatel'skiĭ Gidrometeorologich Institut. **DWB** (M09.326 G975gr)—The formation of thunderstorm processes and territorial distribution are discussed with aid of tabulated data and synoptic charts. Sp attention is given to problems of practical value for aviation and power installations in T caucasia. The information obtained by various authors, listed in 52 references, are revie with tabulated and correlated data and the author's comments. The book contains chapters describing thunderstorm activities and their causes. The first chapter deals local peculiarities in the origin and development of thunderstorms and to the physical geographic characteristics of the processes. The direction of movement and the durati their activity are also mathematically analyzed. The second chapter deals with theore considerations of the effects of the mountain ridges on the formation and developme

understorm processes. Attention is also given to qualitative and quantitative evaluation of currents and their vertical components over mountains and passes, extended to the middle the troposphere. The third chapter concerns the characteristics of basic factors forming the understorm and the method of accounting for them in forecasting under mountain conditions. his chapter also contains reviews of various methods on the preparation of forecasting curve r upper air temperature variation and of so called "emagrams" with daily air temperature istribution according to altitude before the maximum convection is developed. The data on recasts at different periods are assembled in tables. *Subject Headings:* **1. Thunderstorm itivity 2. Orographic effects on thunderstorms 3. Thunderstorm forecasting 4. Tem-rature gradient forecasting 5. Transcaucasia, U.S.S.R.**—*N.P.S.*

12.11–28 551.552:551.542.1

§Reshetov, V. D., **Otkloneniia vetra ot gradientnogo i iavleniia nestatichnosti v atmosfere.** Deflection of winds from the gradient and nonstationary phenomena in the atmosphere.] oscow, Gidrometeoizdat, **1960.** 93 p. 23 figs., 4 tables+tables in appendix, 14 refs., 58 eqs. **WB** (M57 R433ot)—Theoretical and practical considerations of geostrophy and stability of e atmosphere are broadly discussed in connection with various fields of meteorology. Con-mporary dynamic meteorology has found solutions to the problems of cyclo- and anti-clogenesis by hydrodynamic methods and by the use of principles of quasigeostrophy and ability of the atmosphere. Special attention is given to the study of deviation of wind from e gradient character and of pressure from the static one. The data discussed on these viations can be useful for the aerologist, synoptician and aeronavigators. The book contains o chapters. The first gives brief information on the character of wind deviations from ostrophic and actual winds, mathematical formulas of deviations under different conditions, mputations of their values and plots of the results on charts and synoptic maps. The second apter is concerned with mathematical formulas of energy and forces acting for deviation, d also the expressions for the conditions for geostrophicity and stability in the atmosphere, om which the deviation is explained. Attention is also given to the relative evaluation of the bservation errors. The data are tabulated and plotted on charts with reference to the alti-des and the mathematical formulas also include equations for the Archimedes and Coriolis rces, atmospheric turbulent viscosity and air vortexes. *Subject Headings:* **1. Wind deviations Pressure deviations.**—*N.P.S.*

12.11–29 526.1:551.461.2:526.6(494)

Kobold, F. and Wunderlin, N., **Die Bestimmung von Lotabweichungen und Meereshöhen n Berner Oberland auf Grund Astronomischer Beobachtungen und Gegenseitiger Zenit-stanzen.** [Determination of perpendicular deviations and sea level in the Bernese Alps n the basis of astronomical observation and reciprocal zenith distances.] Buchdruckerei interthur Ag, **1960.** 19 p. 10 figs., 6 tables, 19 refs., some eqs. At head of t-p: Société élvétique des Sciences Naturelles. "Annexe au procès-verbal de la 105e séance de la Com-ission Géodésique Suisse tenue au Palais Fédéral à Berne le 2 Avril 1960."—Observations the Eidgenössische Landestopographie and the Schweizerische Geodätische Kommission om 1953 to 1958 for the determination of the shape of the geoid and of sea level are described. he construction of the observational network for the determination of angles of height and erpendicular deviation, the observations themselves; the calculations of perpendicular eviations and ellipsoidical altitudes; the approximative orthometrical heights and the geoid hape are presented. Equalization data and those of approximative geodetic heights are ompiled in tables and illustrated by maps and diagrams as well as on sketches of the network. he combination of astronomical observations and reciprocal height-angle observations is ppropriate for the determination of the geoid on a high mountain-range. The internal mean rors are $\pm 2''$ on perpendicular deviations, ± 3 cm on ellipsoidical as well as on orthometrical titude differences, and ± 4 cm on altitude differences for the geoid and ellipsoid for adjacent oints at a distance of 5 km. *Subject Headings:* **1. Sea level determination 2. Shape of geoid Geodetic networks 4. Bernese Alps, Switzerland.**—*O.T.*

12.11–30 539.38:550.

†Ivakin, B. N., **Microstructure and macrostructure of elastic waves in one-dimension continuous nonhomogeneous media.** *Soviet Research in Geophysics* (issued by American Ge physical Union), Vol. 3, **1960.** 113 p. 29 figs., 30 refs., 282 eqs. **DLC, DWB.** Transl. Consultants Bureau, N. Y. of original Russian **Mikrostruktura i makrostruktura uprugikh vo b odnomernykh neprery v nykh-neodnorodynykh sredakh,** issued as *Akademiia Nauk SSS Geofizicheskiĭ Institut, Trudy*, No. 39 (166), **1958. DLC**—Consideration is given to the proble of the structure of waves propagating in continuous nonhomogeneous and generally absorbi media, with a single spatial coordinate, over intervals infinitesimally small or comparable wi a wave length (microstructure of the waves) and over intervals larger or appreciably larg than a wave length (macrostructure of the waves). Solutions are obtained for wave proble inoperational form, for absorbing media: 1) with a single interface, 2) with two interfa and 3) with periodically repeating layers. The micro- and macrostructure of sinusoidal wa of displacement, pressure and intensity were studied. The possibilities of obtaining solutio to the wave problems in media having smoothly varying parameters are considered. T laws governing the variation of the differential velocity (phase velocity of propagation o wave, measured over an infinitesimally small baseline) are determined, as a function of t wave impedance ratio at interfaces, the coordinate x of the one-dimensional nonhomogene medium and the frequency w. The frequency dependencies of the phase velocities, measu over a finite baseline (dispersion curves) are obtained. The equations obtained for the cut- frequencies make it possible to determine the cut-off frequencies that define the limits of t pass (transparency) band and attenuation band in the medium in question. For freque $W \to 0$, the (integral) velocities for the V, T, and Q modes in discrete layers are determined, well as in a whole section or over some arbitrary baseline of a periodically layered mediu Graphs are constructed for the (integral) velocity of propagation for a section of a periodic layered medium, as a frequency function (dispersion curves) and are compared with the va of the velocity computed on the basis of the formula for mean velocities borrowed from g metric seismics and, in connection with that and with previous findings, the limits of appli bility of geometric seismics in the treatment of one-dimensional nonhomogeneous media considered. The solution of the wave problem in periodically layered media having an ar trary number of layers within a period of the structure is considered. Finally, the solut obtained for continuous media may be applied to the design of discrete (lattice) model. T requires replacing the wave impedance W and the propagation constants Q_0 of continu layers of the media by the corresponding known values of the wave impedance and of propagation constants of discrete "homogeneous layers" of the model. *Subject Headin* **1. Elastic waves in nonhomogeneous media 2. Elasticity 3. Geometric seismics.**—*E.Z.S.*

A4. POPULAR BOOKS

See also: **Biography of the Earth** (Gamow), 12.11–16; **Frozen frontier** (Ross), 12.11–48.

12.11–31 551.58(02):37

*†Scherhag, Richard, **Einführung in die Klimatologie.** [Introduction to climatolog Brunswick, Georg Westermann Verlag, **1960.** 128 p. 9 figs., 12 tables, bibliog. p. 120–1 charts (fold. in pocket). (*Das Geographische Seminar*, ed. by Edwin Fels and Ernst Weigt. A paper back introductory textbook of climatology. An introductory chapter present discussion of climatology as a science. Chapter headings are: The fundamentals of met ology; Planetary circulation; Natural air pressure and wind belts; Climatic classificati Examination of the climatic regions according to the climatic schemes of Köppen and Geig Climatic variations and changes; Basic microclimatology; Influence of climate on pe Modification of climate by people; and Scientific methods of climatology. Finally, weat charts (maps) are discussed. *Subject Headings:* **1. Climatology textbooks 2. Element climatology.**—*E.Z.S.*

12.11–32 551.462(2

†Bascom, Willard, **Hole in the bottom of the sea: the story of the Mohole Project.** Gar City, N. Y., Doubleday, **1961.** 352 p. figs., tables, 48 refs. Price: **$4.95. DLC, D**

(551.4608 B289ho)—The book for the layman which tells the story of the MOHOLE Project and its significance. The book first describes how investigations of earth science are carried out today; how man looks deep inside the earth and backward in time. It then describes how the size, mass and structure of the earth have been worked out, how the composition of the unseen rocks can be estimated, and how the history of the earth has been assembled. It explains how the thickness of the crust is measured and how the best place to drill through it will be located. The final chapters are devoted to modern deep-drilling techniques on land, in shallow water offshore, and in the deep ocean, ending with a description of what the ultimate deep-sea drilling equipment may be like. Scientists in allied disciplines will find information on geology, oceanography, engineering, modern drilling technology and other fields of general interest pertinent to the MOHOLE Project. The procedures for drilling this hole through the Mohorovicic Discontinuity in the ocean bottom off the California coast near Guadalupe Island are thoroughly described and illustrated by means of photographs and schematic diagrams. Appendices list the most pertinent references, definite units used, and list the members of the A.M.S.O.C. (American Miscellaneous Society), which was started in 1952 as a joke in the Office of Naval Research and is now the board which manages the MOHOLE Project within the National Academy of Sciences. A good index is also provided. *Subject Headings:* **1. Mohole Project 2. Deep sea drilling 3. AMSOC Committee 4. Stratigraphy of the ocean floor 5. Guadalupe Island.**—*M.R.* & *E.Z.S.*

12.11–33 551.46(023)

†Dietrich, Günter, **Ozeanographie: physische Geographie des Weltmeeres.** [Oceanography: physical geography of the seas.] Braunschweig, Georg Westermann Verlag, **1959.** 256 p. 19 figs., tables, bibliog. p. 90–91. (*Das Geographische Seminar.*) **DLC** (QC11.D53)—After a review of equipment and auxiliary devices for oceanographic research, general principles of oceanography are explained, only so far as required for a general knowledge and understanding of this branch of science. Physics and chemistry of sea water, description of the world sea and comparative geography of the oceans are outlined. *Subject Heading:* **1. Popular oceanography.**—*S. Nowinska.*

12.11–34 551.46(023)

Behrendt, Ernst, **Oceans.** Garden City, N. Y., Nelson Doubleday, **1960.** 64 p. figs., photos (many in color). "Prepared with the cooperation of Science Service." Price: $1.00. **DWB** (551.46 B421oc)—A vividly illustrated booklet describing various aspects of oceanography or ocean study for the layman or adolescent. The oceans, continental shelves, submarine trenches, waves, wind waves, storm tides, tsunamis, internal waves, tides, deeps, bottom, scattering layers, currents, soundings for temp., salinity etc., the Gulf stream, origin of life, food from the sea, color of sea, plankton, electronic means of locating schools of fish, oil drilling, metal extraction, fresh water production, etc. are among the subjects covered. Twenty colored photos are included. *Subject Heading:* **1. Popular oceanography.**—*M.R.*

12.11–35 551.46(023)

†Carrington, Richard, **Biography of the sea: the story of the world ocean, its animal and plant populations and its influence on human history.** N. Y., Basic Books, Inc., **1960.** 285 p. numerous figs. and plates, bibliog. p. 263–276. **DWB** (551.46 C318bi)—A popular book which includes not only a summary of the history of the sea and the evolution of marine life through geological time, but also a good deal of general information concerning the sea as a physical feature of the earth, and the way it has influenced the lives of men. No pretensions are made to originality of subject matter. The main sources of facts are listed in the bibliography. The first part describes the world ocean, the second part describes the life of the sea, and the third part explains the relationship between man and the sea. It is well illustrated. *Subject Heading:* **1. Popular oceanography.**—*E.Z.S.*

12.11–36 551.579(026)

Leopold, Luna B. and Langbein, Walter B., **A primer on water.** Wash., D. C., U. S. Govt. Print. Office, **1960.** 50 p. 16 figs. **DWB** (M79 L587pr)—This extensively illustrated book contains general information about water and its use and control. The information is

organized in two parts. The first part discusses hydrology and the second describes the d velopment of water supplies and the use of water. The first part is of more interest to t meteorologist. It describes how water circulates from earth to atmosphere and then back earth and the various features associated with water circulation. *Subject Heading:* **1. Wat** —*I.S.*

12.11–37 551.55(02

†Brown, Slater, **World of the wind.** Indianapolis,. Bobbs-Merrill, **1961.** 224 p. biblio p. 211–213. **DLC** (QC931.B7)—A readable book for the layman on the effect of winds various kinds on man and his activities, and the location of these winds. The meteorology not treated except incidentally. Sea and ocean winds, hot dry winds, dust and sand storm erosion and dunes, Chinook or föhn winds, blizzards and cold dry winds, gales, wind ch wind measurements, wind lore, winds in history and literature, water spouts, dust dev tornadoes and swells and hurricanes are among the winds discussed in the 12 chapters. A go list of bibliographic sources and a combined author-subject-place index are appended. *Subj Headings:* **1. Winds 2. Popular meteorology.**—*M.R.*

12.11–38 551.5(01

Spar, Jerome, **La ruta del tiempo.** [The way of the weather.] Con la colaboración Museo Americano de Historia Natural de Nueva York. (Traducción de Carolina Rosell Barroso. 1st ed. Mankato, Minn.) Creative Educational Society, **1960.** 224 p. num ous photos. (*Colección Ciencia Creativa.*) (For abstract on original English, *see* 9.11– Nov. 1958, *Met. Abs.*) **DLC** (QC863.S678)—An elegant Spanish edition of a popular a well illustrated book covering the upper atmosphere, the lower atmosphere, hurricanes, t nadoes, thunderstorms, fog, smog, frost, floods, sunspots, chinooks, climate, seasonal weath forecasts and warnings, instruments and observations, atomic energy and weather, weat ships, rockets and satellites, weather control, etc. Each subject is treated on one full p with a full page illustration or diagram facing the text. The illustrations, some in color, chosen with imagination and are up to date. A good Spanish index is appended. *Sub Headings:* **1. Popular meteorology 2. Elementary meteorology.**—*M.R.*

12.11–39 629.19:523.3(0

Marcus, Abraham and Marcus, Rebecca B., **Tomorrow—the Moon! Planes, missi satellites, space travel.** Englewood Cliffs, N. J., Prentice-Hall, **1959.** 150 p. figs. Pr $3.50. **DLC** (TL793.M3)—This book intended for the layman explains how man-m satellites get into orbit and why they remain there. It provides a brief background of development of the jet- and rocket-propelled planes and missiles and traces the developm of the principles which brought the first man-made satellite into being. Consideration is t given to the possibilities of trips to and from the moon. Some of the features of the moon described. A hypothetical space station, described as a harbor in the sky from which sp ships could be launched and to which they may return, is envisaged. A summary is give known and postulated conditions of the solar system, planets and asteroids. The environm into which the space explorer enters is pictured as extremely hostile. *Subject Head* **1. Space science 2. Popular science books 3. Satellites 4. Astronautics 5. Lunar tra** —*E.Z.S.* Ⓢ

12.11–40 629.19(

DuBridge, Lee Alvin, **Introduction to space.** N. Y., Columbia Univ. Press, **1960.** 24 figs., table, 5 refs., eqs. Price: $2.50. **DLC** (TL793.D8). Review by A. Dalgar *Nature*, London, 189(4758):5, Jan. 7, **1961.**—This book contains four lectures which ina rated the George B. Pegram Lecture Series. The talks, intended for laymen and students forth some of the achievements of space science and technology, some of the hopes for fu research in these fields, and some of the areas of great scientific interest in the solar system the more distant part of the universe. The lectures were concerned with the general subj 1) attaining a space orbit; 2) the space laboratory; 3) the solar system; 4) the universe. *Sa Headings:* **1. Popular science 2. Space science.**—*E.Z.S.* Ⓢ

12.11–41 551.324(797/8,712,712.3)

Sharp, Robert Philip (*Chm., Div. Geological Sci., Calif. Inst. of Technology*), **Glaciers.** ugene, Oregon, Oregon State System of Higher Education, **1960.** 78 p. 23 figs., 15 plates, ible, 15 refs. (*Condon Lectures.*) **DWB** (551.312 S531gL)—This pamphlet presents a escription of some basic facts as background for an understanding of certain facets of modern laciological research. The Blue, Saskatchewan, and Malaspina-Seward Glaciers are used as examples of the various features and phenomena discussed. The aspects of glaciology which are onsidered are: the constituent parts of a glacier, the glacier budget, glaciers and climate, the nversion of snow to glacier ice, the flow of glaciers, structures in glaciers, and the oxygen-otope ratios in glaciers. A glossary of terms and an annotated reference list are included. hotographs and sketches serve to illustrate the discussion. *Subject Headings:* **1. Glaciers Glacier meteorology 3. Glacier micrometeorology 4. Blue Glacier, Wash. 5. Malaspina lacier, Alaska 6. Seward Glacier, Yukon Territory 7. Saskatchewan Glacier, Alberta.** *-E.Z.S.*

12.11–42 91.04(98) 551.506.5:551.326.6/7(98)

Powell, Theodore, **The long rescue.** Garden City, N. Y., Doubleday & Co., Inc., **1960.** 4 p. 12 photos. **DLC** (G670 1881.G726)—A narrative account of the Lady Franklin Bay xpedition or the Greely Expedition as it was later called, and the dramatic story of the rescue the survivors. The expedition reached Discovery Harbor in Aug. 1881. It was a scientific xpedition and all observations were carefully made and recorded; extensive exploration and apping were carried out. Collections were made of vegetable and animal life. The book ontains numerous references to meteorological and glacial conditions observed; floebergs nd pack ice are described but the major interest is in survival methods of travel in the Arctic ver land as well as by water. *Subject Headings:* **1. Arctic expeditions 2. Greely Expedition, 881–1884 3. Meteorological conditions in Arctic 4. Arctic.**—*E.Z.S.*

12.11–43 551.509.8

Dazur, Waldemar, Baron von, **Wetterzeichen überall: eine Wetterkunde für jedermann.** Weather signs everywhere: a popular book on meteorology.] [1st ed.] Munich, E. Heim-an, **1959.** 180 p. 8 photos. **DLC** (QC998.D33)—A systematic collection of weather roverbs of the present day as well as of the middle ages. It is nonscientific but does contain any practical rules which would help in foretelling weather when no instrumental observations r weather maps are available. The first part deals with observations and rules in general over he past millenium. The second part contains 10 chapters dealing with: 1) periodicity; effects noted on inanimate objects; 3) weather sensitivity; 4) weather sensitive plants; animals; 6) human beings; 7) celestial and sky signs; 8) atmospheric signs; 9) wind, clouds, g, rain, snow, dew, ice, thunderstorm signs; 10) where lightning will strike. An author and ubject index, a glossary and a bibliography are appended. *Subject Headings:* **1. Weather lore Weather signs.**—*M.R.*

A5. HANDBOOKS—MANUALS—ATLASES

See also: **Handbook of aerology** (Hesse, *ed.*), 12.11–1; **Monthly mean 50 mb and 100 mb charts** (Panofsky), 12.11–158.

12.11–44 551.582.3(26)(265/266)

†Seckel, Gunter (*Honolulu Biological Lab., U. S. Bureau of Commercial Fisheries*), **Atlas the oceanographic climate of the Hawaiian Islands region.** [**1960.**] 104 p. 28 figs., refs., numerous charts. Reproduction of typescript. **DWB** (551.46 S444at)—This imatic atlas of the Hawaiian Islands region is divided into two parts: 1) the distribution of rface parameters, such as the depth of mixed layer, temperature, salinity and geopotential pography are described and 2) the processes with which these parameters are associated are scussed: the heat budget, events at the sea surface and advection. Characteristic advection agrams, characteristic heating curves and intrinsic temperatures are defined. It is then own how these can be used to interpret continuous surface temperature data. An integrated

account of the oceanographic climate of the Hawaiian Islands region is given in the fi part of this study. Appendices give the source of data, explain how the data were treated a contain a variety of charts showing distribution of depth of mixed layers, surface temperat and salinity, the surface dynamic topography, characteristic advection diagrams and h advection charts. Twenty-eight figures consisting of charts, graphs, and maps are append *Subject Headings:* **1. Marine atlases of Hawaiian Islands region 2. Oceanographic clim 3. North Central Pacific.**—*E.Z.S.*

12.11–45 551.521:378(

U. S. Agricultural Research Service, **USDA radiological training manual for inserv training.** Wash., D. C., U. S. Govt. Print. Office, **1960.** 281 p. figs., refs. **DWB** (M10. U581un)—The material contained in this publication is organized in textbook style. The t is divided into four parts. In Pt. I, the theoretical aspects of radiation and its biological effe are explained. Pt. II covers the statistical aspect of radiation. The subject of radiat measurement is discussed. In Pt. III the application of this study to agriculture and its ma areas of production is described. Pt. IV discusses radiological monitoring and the relev training programs. *Subject Headings:* **1. Training manuals 2. Radiological training manu 3. Radiation effects on agriculture.**—*I.S.*

12.11–46 551.582.3:551.

*Walter, Heinrich and Lieth, Helmut (*both, Botanische Institutes der Landwirtschaftlic Hochschule, Stuttgart*), **Klimadiagramm-Weltatlas, 1 Lieferung.** [Climate diagrams—a w atlas, Pt. 1.) Jena, VEB Gustav Fischer Verlag, **1960.** Unpaged. Loose-leaf. 60×45 refs. Introd. in German with summarized introductions in Russian, Spanish, French English. Lieferung 1 contains charts for Iberian Peninsula, West Europe, India, Afr South America and Australia. Review by A. Schulze in *Meteorologische Rundschau*, Be 14(3):95–96, May/June 1961.—Climatic graphs from all the accessible meteorological stat of the world have been collected for the purpose of comparing regions with similar climates vegetation. Besides a means for studying problems of plant geography, agriculture and fo production, this atlas serves as a basis for a more accurate climatic classification than tha Köppen. The uniform pattern of these diagrams indicates station, altitude, number of y of observation of temperature and precipitation, mean annual temperature, mean an sum-total of precipitation, mean daily minimum of the coldest month, absolute minim mean daily maximum of the hottest month, absolute maximum and mean range of t perature by the letters from a to j. The monthly means of temperature and of precipita are shown by curves. Climatic cartograms were produced from the diagrams of nearly all climatic stations of the world. Regions of stations with similar diagrams are separated borderlines on the cartograms. The principal climatic types include: I. equatorial hu II. tropical, summer rains; III. subtropical, hot and arid; IV. mediterranean, winter ra V. warm-temperate, humid; VI. humid, with cold season; VII. arid, with cold season; VIII. real; IX. Arctic; X. mountain areas in the other regions. The atlas comprises about t maps representing the climate of the world in uniform graphic representation. Classificat of climatic regions, the positions of all stations, and some specimen diagrams are containe each unit map. All diagrams of the individual stations arranged according to the diffe regions have a number of supplements. Each colored main map lists the stations on its v Some of the maps, partly folded, also contain profiles of special terrain formation. Sp references for each section are also supplied. The atlas represents the first attempt to pre the climatic conditions of a certain place by eye-catching graphical representation. A sim attempt was made previously by NUTTONSON'S **Agroclimatic Analogues,** which were restri however, to the climatic conditions of the U. S. The present work is aimed to make pos the comparison of various places with similar vegetation. The months for the Nort Hemisphere start with January; those of the Southern Hemisphere with July, in order to m a direct comparison possible. In special cases, climatograms based on values of som consecutive years provide information on the frequency of disasters in harvest and also s years of drought at a glance. With the basic data provided, similar climatograms ca constructed for any region. Examples illustrate the different types of diagrams in th

oduction where the geographical divisions of the world atlas are shown on an outline map. *bject Headings:* **1. Climatic atlases 2. Climatic charts of the world 3. Climatic classifica-n.**—*O.T.*

A6. TRANSLATIONS

See: **Soil moisture** (Rode), 12.11–18; **Way of the weather** (Spar), 12.11–38; **In the center of the Soviet Arctic** (Bogorov), 12.11–51.

A7. IGY—IUGG

See: **I.U.G.G. Assoc. of Phys. Oceanog., Toronto, Sept. 1957,** 12.11–7; **Ice cover of Antarctic** (Model', Nudel'man), 12.11–54; **Index JE of the E layer** (Minnis), 12.11–108; **URSI Committee for IGY** (Beynon), 12.11–109; **World-Wide Ionos. Sounding Com. of URSI Com. for IGY,** 12.11–110; **Meas. of deep currents, E. North Atlantic** (Swallow, Hamon), 12.11–132; **Monthly mean 50 mb and 100 mb charts** (Panofsky), 12.11–158; **Seasonal variation of potential gradient in free atmos., Poona** (Mani et al.), 12.11–395; **Structure of electrostatic field in free atmos.** (Imianitov, Chubarina), 12.11–396.

A8. ARCTIC—ANTARCTIC

Arctic

See also: **The long rescue** (Powell), 12.11–42; **Canadian Arctic temps.** (Thomas), 12.11–371.

12.11–47 551.511:551.547(98) 551.513.2:551.510.53(98)

§†Boville, B. W., **A dynamical study of the 1958–1959 stratospheric polar vortex.** McGill iv. Arctic Meteorology Research Group, Contract AF 19(604)-3865, Scientific Report No. 9; blication in Meteorology, No. 36, Feb. **1961.** 134 p. 44 figs., 8 tables, 10 charts (in color), bliog. p. 128–133. **DWB**—The circulation of the stratosphere and its relation to the tropo-here is presented for the six-month period October, 1958 to March, 1959. The study is sed mainly on circumpolar analyses at five-day intervals at the 500 mb, 100 mb and 25 mb els, supported by numerous space and time sections. Fourier analysis of the circumpolar arts is used to compute energies and energy exchanges after the manner of Lorenz (1955) d unstable wave characteristics following the linear theory of Fleagle (1957). The polar-ht middle stratosphere is found to be baroclinically unstable in mid-winter, otherwise the rgy exchanges appear to be ascribable to forced perturbations. *Subject Headings:* **1. Polar rtexes 2. Stratospheric circulation 3. Circumpolar charts 4. Baroclinic instability 500 mb charts 6. Arctic.**—*Author's abstract.*

12.11–48 910.1(98)(087.5)

Ross, Frank Xavier, **Frozen frontier: the story of the Arctic.** N. Y., Crowell, **1961.** 197 p. otos. **DLC** (G614.R65)—A book dealing with the discovery, exploration, and geography the Arctic intended for the high school student but of general interest to the layman. In lition to narrating the highlights of history of exploration, it contains descriptions of recent d current research activities in the Arctic in relation to military, scientific and economic velopments. Some of the results of the research of atomic submarines in the Arctic and o the meteorological and oceanographical research activities of various nations are explained. *bject Headings:* **1. Arctic geography 2. Juvenile science books 3. Popular science 4. Arc-**—*E.Z.S.*

12.11–49 551.521.18:551.576.2(98)

Marshunova, M. S., **O raschete balansa dlinnovolnovoĭ radiatsii pri pasmurnom nebe v ktike.** [Long wave radiation balance during overcast sky in the Arctic.] *Leningrad. ktícheskiĭ i Antarkticheskiĭ Nauchno-Issledovatel'skiĭ Institut, Trudy,* 226:109–112, **1959.** gs., 6 refs., 4 eqs. **DLC** (G600.L4 t.226)—The difference between descending and ascending fared radiation, called balance, is important for the study of the nature of temperature

variations of the air in a free atmosphere, since these variations cause frosts and fogs and eith accumulation or melting of snow cover. Lack of experimental data in the Arctic mak theoretical computation, as well as the methods applied, of particular importance. Data fro 1949–1955 and from the drifting stations "North Pole 3" and "North Pole 4" for 1954–19 were analyzed. In the case of a clear sky, the computed and experimental values were in go agreement. Some deviations occurring during the cold season and an overcast sky we probably due to the method of cloud evaluation. *Subject Headings:* **1. Infrared radiati balance 2. Cloudiness effects on infrared radiation 3. Arctic.**—*S. Nowinska.*

12.11–50 91.04(98) 551.5:550.3(9

Kanaki, V. G., **Ekspeditsii Arkticheskogo Instituta v 1957 godu.** [Expeditions of t Arctic Institute in 1957.] *Problemy Arktiki*, No. 4:103, **1958. DLC**—Transl. into Engl by Sumner Kirshner and David Kraus, issued by the American Meteorological Society unc Contract AF 19(604)-1936, as its T-RC-16+, p. 1–2, Sept. **1959.**—Gives an account of t Arctic exploration activity of the Arctic Institute of the U.S.S.R. In 1957, twenty two expe tions were sent out. Five scientific research observatories are operating in the Arctic. account of some expeditions is given. *Subject Headings:* **1. Arctic expeditions, 1957 2. Sov Arctic and Antarctic Institute 3. Arctic observatories 4. Arctic.**—*A.H.K.*

12.11–51 551.5:550.3:06(593) 91.04(

Bogorov, V. G., **V tsentre Sovetskoĭ Arktiki.** [In the center of the Soviet Arcti *Molodoĭ Kommunist*, 12(9):75–80, **1954.** Transl. into English by Ane M. Petersen (*ed.* David Kraus), issued by American Meteorological Society under Contract AF 19(604)-19 Jan. **1959.** 10 p. Complete transl.—The paper presents a historical survey of the Sov Arctic. It emphasizes the great importance of this region for the U.S.S.R. and surveys efforts made to master it. Most attention is given to Russian activities in this area follow the Bolshevik Revolution. In 1921 LENIN signed a decree by which an institute for the stu of the North was organized, this later became the Arctic Institute. The increasing inter and the growing Arctic exploration activities since then are traced in four stages; the fi stage being the post-war period. The establishment of the first drifting scientific station March 1937 was a big step forward, since it made possible more precise weather and ice fo casts, so necessary for the development of navigation and for long distance flights. The pa considers the valuable information which the efforts of Arctic scientists have yielded. portant discoveries in Arctic meteorology and in other areas are summarized. *Subject He ings:* **1. Soviet Arctic scientific investigations 2. Soviet Arctic and Antarctic Institute 3. Ar meteorology 4. Arctic.**—*I.S.*

12.11–52 551.326.7 551.322:539.

Kerr, Arnold D., **Plastic deformation of floating ice plates subjected to static loa** *U. S. Snow Ice and Permafrost Research Establishment, Research Report* 57, Sept. **1959.** 1 11 figs., 11 refs., numerous eqs. **DWB, DLC**—The problem is analyzed mathematically decreasing and increasing rates of deflection. The analysis is based on the assumptions t for decreasing rates of deflection the floating ice plate will deform under lateral load with failure until the weight of the displaced water is equal to that of the load, and that for increa rates, deflection increases until the ice plate collapses under and near the load. It is also s gested that the total deflection at a certain time is the result of the elastic deflection sur and the plastic deflection due to shear only, the shear forces obeying Newton's law of viscos Deflection equations for plastic deflection due to shear are derived for an infinite plate subje to a line load, an infinite plate subjected to a concentrated force (axially symmetrical flexu and an infinite plate subjected to uniform circular load. Equations for elastic deflection t added to the plastic deflection due to shear are suggested. According to the statements assumptions made and the results obtained, the total system of an ice plate resting on a lic base can be considered as a Kelvin body for the case of decreasing rates of deflection. *Su Headings:* **1. Plastic deformation of ice 2. Floating ice plates.**—*Author's abstract.*

Antarctic

See also: **Biography of H. Arctowski** (Kosiba, Zych), 12.11–66; **Obituary of H. Arctowski** (Zinkiewicz), 12.11–67; **In mem. G. Lüdeling** (Knock), 12.11–68; **Obituary of O. G. Krichak and colleagues** (Skliarov), 12.11–74; **Atmos. circulation over Antarctica** (Krichak), 12.11–215; **Atmos. fronts, W. Antarctica** (Astapenko), 12.11–227; **Upper atmos. wind meas., Antarctica** (Elford, Murray), 12.11–298.

12.11–53 91.04(99) 551.506.5(99)

Shcherbakov, D. I. (*Internatl. Antarctic Res. Committee, U.S.S.R.*), **In the kingdom of snowstorms and winds.** *Indian Journal of Meteorology and Geophysics*, New Delhi, 10(4):373–376, Oct. 1959. **DWB, DLC**—An account of the progress of Antarctic exploration in the area assigned to the U.S.S.R. under international agreement. The Soviet explorers initiated their work with a study of the inner districts of the continent. The employment of sledge tractor-trains made it possible to create the research stations Pioneerskaia, Vostok-1, Komsomolskaia, Vostok, Sovetskaia and, finally, on Dec. 14, 1958 a station in the region of the Pole of Relative Inaccessibility. The expedition claims to have obtained valuable data concerning the thickness of the ice cover of the Antarctic and the state of the atmosphere above the Antarctic. The presence in the region of ice-free sections, the peculiar "oases" of the Antarctic is reported. Mention is also made of the importance of aviation in exploration and of the oceanographic studies conducted by the Soviet scientists. *Subject Headings:* **1. Antarctic expeditions 2. Ice cover of Antarctica 3. Atmosphere over East Antarctica 4. Soviet Antarctic research 5. East Antarctica.**—*I.S.*

12.11–54 551.324.3(99)

Model', Iu. M. and Nudel'man, A. V., **Ledianoĭ pokrov Antarktidy.** [The ice cover of the Antarctic.] *Priroda*, Moscow, No. 11:93–97, Nov. 1959. 5 figs. **DLC**—The results of measurements of thickness of the ice cover in Antarctica obtained by Swedish, English, U. S., Soviet, Australian, etc. expeditions are summarized and a map showing the distribution of ice thickness and depth of rock bed is presented. The data collected during the IGY indicate that continental land underlies the Antarctic ice cover, and the area of this continental mass is considerably smaller than the area of the ice mass. Furthermore, many elevations at the edges of Antarctica above sea level both hidden by the ice cover as well as protruding above it are islands similar to the cliffs in the Mirny region. *Subject Headings:* **1. Ice cover of Antarctic 2. Antarctica.**—*I.L.D.*

12.11–55 551.324.28(99) 551.326.62(99)

Markov, K. K., **Dva chastnykh voprosa geografii vostochnoĭ Antarktidy.** [Two special problems of the geography of East Antarctica.] *Geograficheskoe Obshchestvo SSSR, Izvestiia*, 90(4):305–314, 1958. 6 figs., table, 10 refs. **DLC**—A detailed summary is given of the evidence for the existence of an active volcano on the Amery Ice Shelf glacier near 70°E long. The discovery of this volcano was attributed to Capt. G. S. N. Sjövold in January 1931 by the Norwegian whaler and Antarctic explorer, Lars Christensen. The subsequent narrative and cartographic literature concerning the existence of nonexistence of these volcanoes is reviewed. A thorough exploration of Amery Ice Shelf glacier by the Soviet vessel "Lena" in 1957 has provided evidence that such volcanoes do not exist. The problem of the existence of White Island, which during the past quarter century has been reported as situated near 50°E long. near the area where Enderby Land borders on Prince Olaf Land is examined. The literature on the discovery of this island and on its location and characteristics is reviewed. The Soviet vessel "Lena" has collected evidence confirming the existence of White Island. It is a 20 km long ice dome similar to the Drygalski Island dome; it rises to an altitude of 300 m and its geographic coordinates are 66°35′S lat. and 48°56′E long. There is no ice tongue in this region at present. Looking from the north on the dome of White Island one sees the summit of Christensen Mt., which is 125 km south of the island and on the continent. The height of this mountain is 1200 m. *Subject Headings:* **1. Antarctic geography 2. Amery Ice Shelf glacier 3. White Island, Antarctica 4. East Antarctica.**—*I.L.D.*

12.11–56 525.14:550.341.6(99

Evison, F. F.; Ingham, C. E.; Orr, R. H. and Le Fort, J. H., (*all, D.S.I.R., Wellington, New Zealand*), **Thickness of the Earth's crust in Antarctica and the surrounding oceans.** *Geophysical Journal*, London, 3(3):289–306, Sept. 1960. 14 figs., 2 tables, 8 refs. **DWB, DLC**—Love waves and Rayleigh waves from eight earthquakes recorded at Hallett Station, Scott Base and Mirny have been analyzed and the dispersion compared with that predicted by theory for simple model crusts. The average thickness of the crust in eastern Antarctica is found to be about 35 km, as is typical of continents, whereas Marie Byrd Land with an average thickness of about 25 km cannot be regarded as truly continental. Love wave dispersion indicates that the thickness of the solid crust in the oceanic regions surrounding Antarctica varies from about 5 km to 10 km, the smaller values being associated with the deep basins. It is shown that the determination of oceanic crustal thickness from Rayleigh wave dispersion is in general subject to large uncertainties, nor can one usually rely on values of the thickness of unconsolidated bottom sediments obtained by this means. *Subject Headings:* **1. Earth's crustal thickness 2. Antarctic earthquakes 3. Antarctica 4. Antarctic Ocean.**—*Authors' abstract.*

12.11–57 551.5(99):061

Nauchnaia konferentsiia po problemam meteorologii Antarktiki. [Scientific conference on meteorological problems of Antarctica.] *Meteorologiia i Gidrologiia*, Leningrad, No. 1:61–63, Jan. 1960. **DWB, DLC**—At the conference on Antarctic meteorology held in Moscow during Aug. 26–28, 1959, 35 papers dealing with the atmospheric circulation, radiation balance and climate of Antarctica were delivered. Some of the papers presented and the participating scientists are mentioned. Of special interest was G. V. Gruza's paper on **Problems of the study of the planetary circulation with the aid of characteristics of large scale turbulence.** The most heated discussions were aroused by questions dealing with the incursions of cyclones into the continent of Antarctica and the existence of a continental Antarctic cyclone. V. A. Bugaev presented a paper on the **Climatic zones of East Antarctica.** *Subject Headings:* **1. Antarctic conferences 2. Antarctic meteorology 3. Climate of Antarctica 4. Antarctica.**—*I.L.D.*

12.11–58 551.578.45(9

*Rusin, N. P., **Gorizontal'nyĭ perenos snega v Antarktide.** [Lateral displacement of snow in the Antarctic region.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 96:31–37, **1959.** 2 figs., 6 tables, 2 refs. **DWB**—On the basis of data on 400 snowstorms observed at Mirny, the author attempts to establish a relationship between snowstorm intensity and the meteorological parameters U_5 = wind velocity at 5 m, K_1 = turbulence coefficient and τ = tangential stress on the snow surface. A graph of the relationship of snowstorm intensity to mean wind velocities at 5 m indicates that a distinct linear relationship exists between these two elements and that a "critical value" of wind velocity at various altitudes and diverse meteorological conditions on transition from snowstorms of one intensity to those of another can be determined approximately. It was found possible to delimit the transition from one type of snowstorm to another such as from a low level to a general snowstorm. The fundamental transport of snow was found to take place primarily near the surface of the earth itself. The variation of the quantity of transported snow height for low level snowstorms can be expressed by the equation

$$CZ = \text{const} \qquad \text{or} \qquad C = \text{const}/Z$$

where C = amount of snow (g/cm² hour, Z = height in meters). Data are presented on the mean wind velocity at different levels and the value of the turbulent coefficient at which horizontal snow transport begins in Antarctica, mean values of the roughness parameter at Mirny during the winter season, values of wind velocity and other meteorological parameters for snowstorms of diverse intensities at Mirny, amount of snow transported in a horizontal direction at different altitudes, etc. *Subject Headings:* **1. Snow transport in Antarctica 2. Snowstorms in Antarctica 3. Mirny, Antarctica.**—*I.L.D.*

12.11–59 551.521:551.578.46(99)

*Rusin, N. P., **Radiatsionnyĭ balans snezhnoĭ poverkhnosti Antarktidy.** [Radiation balance of the snow surface in the Antarctic.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 96:3–30, **1959.** fig., 17 tables, 8 refs. **DWB**—Extensive data on the radiation balance of East Antarctica obtained during the First Soviet Antarctic Expedition are presented and analyzed. The data given in tables includes the following: radiation intensity at Mirny for Jan. 1956–Jan. 1957 giving hourly means of total radiation, reflected radiation, albedo, scattered radiation, radiation balance, direct radiation on a horizontal surface, effective radiation, and radiation extinction; totals of daily radiation balance components at Mirny, Pioneerskaia and Oazis, monthly components of radiation balance at these stations and also at Maudheim and Port Martin; maximum intensity of radiation for clear days at the various stations for each month, maximum values of scattered radiation at Mirny and Pioneerskaia for each month; maximum values of direct radiation upon a perpendicular surface at Mirny and Pioneerskaia; mean and limiting values of radiation balance for different sky conditions, etc. *Subject Headings:* **1. Radiation balance of snow cover 2. Soviet Antarctic expeditions 3. East Antarctica.**—*I.L.D.*

A9. CONFERENCES—SYMPOSIA

See: **Symposium on Man and Animals in the Tropics, 12.11–2; Symposium on air pollution control, 12.11–3; Conf. on Physical Chem. in Aerodynam. and Space Flight, 12.11–6; Scientific conf. on met. problems, Antarctica, 12.11–57; Weather problems in agric.** (Penman), **12.11–82.**

A10. SOCIETIES—INSTITUTIONS—SERVICES

See also: **Hist. of U. S. Weather Bureau** (Whitnah), **12.11–24; Expeditions of Arctic Institute, 1957** (Kanaki), **12.11–50; Agromet. works of Kazakh Scientific Res. Hydromet. Inst.** (Kulik, Sagatovskiĭ), **12.11–91; Internatl. co-operation in marine sci.** (Deacon, **12.11–120; Obs. of German climatic stations** (Brose), **12.11–156.**

12.11–60 551.5:061.2(73)

McTaggart-Cowan, Patrick D., **The new organization of the American Meteorological Society.** *American Meteorological Society, Bulletin*, 42(2):68–70, Feb. **1961. DWB, DLC**—The re-organization of the American Meteorological Society is discussed. Many new bodies have been created to exercise authority and responsibility for detailed operations of the Society leaving the Council free to deal with broad policy matters. The Executive Committee is charged with most of the executive activities of the society. The Commissions will be charged with most of the tasks formerly carried out by the Council. The principal operating components of the Commission shall be known as Boards. This new organization of the Society may not solve all the problems but provides a framework within which the load of work can be shared. *Subject Heading:* **1. American Meteorological Society.**—*A.H.K.*

12.11–61 551.5:061.2(73)

Brooks, Charles F. (*deceased*), **The Society's first quarter century.** *Weatherwise*, Boston, 2(6):223–230, Dec. **1959.** 4 photos, table. (This article is reprinted from *American Meteorological Society, Bulletin*, 25(5):163–170, May **1945.**) **DWB**—This short historical survey of the American Meteorological Society by the late Charles F. Brooks was presented at the 25th Anniversary meeting of the Society at Kansas City in Jan. 1945. The paper traces the establishment and steady expansion of the society since 1919, when the society was first organized with a membership of 586, up to 1944. All the pertinent information covering items such as membership, scope of activities, publications, finances, etc., is discussed and tabulated. Three photographs, two of Dr. Brooks and one of the Blue Hill Observatory of Harvard University, a center of AMS activity, are also included. *Subject Heading:* **1. American Meteorological Society.**—*I.S.*

12.11–62 91.04(51) 551.506.5(5

Chu, Coching (*Academia Sinica*), **Scientific expeditions undertaken by Academia Sini in recent years.** *Scientia Sinica*, Peking, 8(9):887–909, Sept. 1959. **DLC**—A résumé of t results of seven expeditions undertaken by the Academia Sinica since 1951. The first was t Tibet Expedition of 1951–1954 in which a party of 56 scientists participated. During t investigations a meteorological survey of the region was also made, and has been briefly note The third was the Amur Valley Expedition (Aug. 1956), included investigations concerni the physical environment of the Amur Valley as well as hydropower. The fourth expeditio to Kansur and Chinghai Provinces (1958), included a party for glacier study. The Sovi glaciologist, L. D. DOLGOSHIN of the Institute of Geography was a member of the team. 1958 the glaciological work was limited to the Nan Shan region. A research team on hydrolo was present in an expedition to Sinkiang in 1956. The paper also reports on Chinese activit in the field of oceanology. Special mention is made of a plan in the summer of 1958 to make more extensive oceanographic survey of seas adjacent to China, including the littoral of t Yellow Sea, the Eastern China Sea and the South China Sea. The survey was scheduled be completed by the end of 1959. *Subject Headings:* **1. Chinese meteorological expeditio 2. Chinese glaciological expeditions 3. Chinese oceanology research 4. China.**—*I.S.*

12.11–63 551.5:06(5

Chao, Chiu-chang (*Dir. Inst. of Geophysics, Academia Sinica*), **New China's meteor logical science making great strides forward.** Dec. 3, 1959. Photocopy of typescript transl. of original (8 p.) article in Chinese in *Jen-Min Jih-Pao*, Peking, Sept. 14, 1959. **DW** (M09) C539ne)—An account of the development of meteorology in communist China. 1956, a 12-yr plan was launched. Since 1958 much progress has been achieved. The probl of forecasting severe weather has received much attention. The great floods which rava China are relatively easy to forecast. In the line of medium and long range forecasting, t Chinese have been able to determine the existence of natural Asiatic weather periods which short lived, mobile and complex compared to European weather periods. *Subject Headin* **1. Progress in meteorology 2. China.**—*A.H.K.*

12.11–64 551.5:061.1(52)(

Chen, Cheng-siang, **The meteorological field of Japan.** *Meteorological Bulletin*, Formo 4(1):1–5, March 1958. fig. In Chinese; English summary p. 1. **DLC**—This is a revi of the development of meteorology in Japan since 1845 when the first observatory was set in Nagasaki. The author discussed the following developments chronologically: establishm of stations in various areas, relations between meteorology and geography in the early peri government regulations and jurisdiction, reform of the Central Meteorological Observat (established on Jan. 1, 1887, becoming the Japan Meteorological Agency on July 1, 195 personnel and their achievement. The number of trainees and trained staff of JMA exce 7,000. The total volumes in the library exceed 30,000, with more than 76 journals receiv each month. The educational program including departmental organization, number students and degree plan is described. *Subject Headings:* **1. History of meteorology 2. Jap Meteorological Agency 3. Japan.**—*K.C.*

A11. EDUCATION—HISTORY—BIOGRAPHY—BIBLIOGRAPHY

EDUCATION

See: **Met. field of Japan** (Chen), 12.11–64.

HISTORY

See also: **Hist. of U. S. Weather Bureau** (Whitnah), 12.11–24; **Am. Met. Soc.** (Brooks), 12.11–61; **Met. field of Japan** (Chen), 12.11–64; **Alexander von Humboldt's met. and climat. works** (Körber), 12.11–72; **Lightning intensity in Sweden** (Müller-Hillebrand), 12.11–397.

12.11–65 551.506.3:551.582.2(4

Dixon, F. E. (*Irish Met. Service*), **An Irish weather diary of 1711–1725.** *Royal Meteorological Society, Quarterly Journal*, 85(366):371–385, Oct. 1959. fig., 12 tables, 16 refs. **DW**

DLC—A comprehensive account of the oldest extant weather diary for Ireland, which was presented to the Royal Society in 1726 by THOMAS NEVE. After a discussion of the diarist and the diary in general, the author critically examines the diary and the results are presented in a series of tables and comparisons are made with modern data. *Subject Headings:* **1. Weather diaries 2. Ireland.**—*I.S.*

BIOGRAPHY

See also: **The Earth today: papers dedicated to Sir Harold Jeffreys, 12.11–5.**

12.11–66 551.5:92

Kosiba, Aleksander and Zych, Stanislaw, [**Biographical sketch of**] **Henryk Arctowski (July 15, 1871–Feb. 21, 1958).** *Przegląd Geofizyczny*, Warsaw, 4(2):83–90, **1959.** photo. In Polish; English summary p. 89–90. **DWB, DLC**—HENRYK ARCTOWSKI was born in Warsaw in July 1871. He studied in Belgium and France from 1888 to 1890 and then worked in PROF. SPRING'S Chemical Institute in Liège. From 1897 to 1899 he took part in the Belgian "Belgica" Expedition to the Antarctic being in charge of research work on geology, oceanography, glaciology and meteorology. Prior to the expedition he undertook special preparatory work in the Alps, in England and Belgium. On his return from the Antarctic to Belgium he devoted his time to preparing and editing the material collected in the above mentioned periods, publishing the results in *Expédition Antarctique Belge*, 1897–1899. *Rapports Scientifiques* (complete bibliog. in *Acta Geophysica Polonica*, 7(3/4), **1959**). Having published the Antarctic material, ARCTOWSKI gave his attention mainly to problems of weather and climate, working at the Royal Observatory in Uccle. In 1909, ARCTOWSKI took up residence in U. S. where he continued his scientific work on weather and climatic variations and their correlation with changes in solar activity—sun spots and solar constant. In 1910 he visited Spitsbergen. From 1918–1920 he was at Versailles as a member of the American House Commission for Polish Affairs. In 1920 ARCTOWSKI returned to Poland where he accepted the Chair of Geophysics and Meteorology at Lwów University and organized an Institute doing i.e. field research on geothermic degree and properties of oil in the Carpathian oil wells, magnetic research, aerologic research for the oil industry and also scientific work on weather and climatic variations and dynamics of the atmosphere. The results were published in the *Bulletins* of the Institute from 1921 to 1939, comprising a total of 133 papers. In 1939 ARCTOWSKI went to the U. S. to take part in a Congress of the International Union of Geodesy and Geophysics in Washington. The outbreak of the war made his return to Poland impossible. In 1939, in his 68th year of age, he joined the scientific staff of the Smithsonian Institution, where he worked until 1950 (his 80th birthday), publishing numerous papers, notably on correlation between weather and climatic variations and solar constant and sunspots. He died in Washington in Feb. 1958. ARCTOWSKI published over 300 scientific works and left numerous further papers ready for print. This material was sent to Poland and is being taken care of by the University of Wroclaw. *Subject Headings:* **1. Biography of Henryk Arctowski 2. Arctowski, Henryk 3. Antarctic expeditions 4. Solar-weather relationships.**—*Authors' abstract.*

12.11–67 551.5:92

†Zinkiewicz, Wlodzimierz, [**Obituary of**] **Henryk Arctowski, 1871–1958.** *Przeglad Geograficzny*, Warsaw, 31(1):198–209, **1959.** photo. In Polish. List of 113 of Arctowski's publications, p. 204–209. **DWB.** Also: Arctowski, Henryk Bronislaw, **Bibliografia prac naukowych Henryka Arctowskiego.** [The bibliography of scientific works of Prof. H. Arctowski.] *Acta Geophysica Polonica*, Warsaw, 7(3/4):282–295, **1959.** 261 titles, 1894–1944. **DWB, DLC**—The unusually creative intellect of ARCTOWSKI enabled him to carry on scientific activity for more than 60 years. This activity started immediately after the completion of his studies at the Sorbonne in about 1894 and reached its full development in the period between the two World Wars. In 1920, ARCTOWSKI organized the first Polish Department of Meteorology. This was later transformed into the Institute of Geophysics and Meteorology of the Lwów University. The author enumerates and discusses ARCTOWSKI's achievements in the field of geography (scientific supervisor of the Antarctic expedition on the "Belgica") and meteorology and climatology (especially the cartographic methods used in climatological

investigations, paleoclimatic studies, etc.). During the Second World War and almost to th end of this life, ARCTOWSKI worked at the Smithsonian Institute in the U. S. *Subject Heading* **1. Obituary of Henryk Arctowski 2. Bibliography of Henryk Arctowski 3. Arctowski, Henryk** —*A.M.P.*

12.11–68 551.5:9

Knoch, K. (*Offenbach a.M.*), **Zum Gedenken an Georg Lüdeling 1863–1960.** [In memor of George Lüdeling.] *Meteorologische Rundschau*, Berlin, 13(6):161–162, Nov./Dec. **1960 DWB, DLC**—GEORGE LÜDELING'S scientific career is outlined. His scientific work include research in geomagnetism, atmospheric electricity and meteorology. He worked up th atmospheric electricity observations of the Antarctic expeditions of the "Belgica" and ALFRED WEGNER'S expedition to Greenland. As director of the precipitation section of th Prussian Meteorological Institute in Berlin he issued the **Introduction to observation procedu and the calculation of observations at German meteorological stations.** *Subject Heading* **1. Obituary of George Lüdeling 2. Lüdeling, George.**—*I.L.D.*

12.11–69 551.5:9

Cheng, Kenneth T. C., **Biography of Dr. T. Okada [1874–1956].** *Meteorological Bulleti* Taipei, Formosa, 2(4):1, Dec. **1956.** Photo. In Chinese. **DLC** (Orientalia)—OKA graduated from Tokyo Imperial University in 1899 and entered the Central Weather Statio In 1923 he was appointed chief of the station, staying there until his resignation in 1941. 1924 he was awarded a prize for Meteorology by the British Royal Society, and he becan a member of the Society in 1925. OKADA'S most note-worthy achievements were his meth of typhoon forecasting, his maritime and oceanography observations, the establishment of M Fuji Observatory and the earthquake observatory network. He was an expert in the analys of Bai-u typhoon, cyclones and anticyclones. His works include over one hundred artic published in various journals and magazines; and over ten books pertaining to meteorologic instruments and theories. *Subject Headings:* **1. Biography of T. Okada 2. Typhoon for casting techniques 3. Okada, T.**—*K.C.*

12.11–70 551.594:92 551.5:9

Israël, H., [**Obituary of**] **Fritz Schindelhauer.** *Beiträge zur Geophysik*, Leipzig, 69(1):1– **1960.** photo. **DWB, DLC**—A brief biographical note concerning the life and work of FRI SCHINDELHAUER who died June 20, 1959 in Potsdam at the age of 78. He served as a seni investigator at Meteorologisch-Magnetische Observatorium until his retirement in 195 His work centered largely on problems of atmospheric electricity. *Subject Headings:* **1. Obi uary of Fritz Schindelhauer 2. Atmospheric electricity 3. Schindelhauer, Fritz.**—*E.Z.S.*

12.11–71 551.593:

†Optical Society of America, Frederick E. Ives Medal Committee, **Richard Tousey, Freder Ives medalist for 1960.** *Optical Society of America, N. Y., Journal*, 51(4):379–383, Ap **1961.** Publications by Richard Tousey, p. 382–383. **DWB, DLC**—Describes the work RICHARD TOUSEY, who was awarded the Frederic Ives Medal for his distinguished work optics. In the field of atmospheric optics he made studies of the atmospheric attenuation light and brightness of the sky. He wrote a series of papers on the visibility of stars a planets in daytime. With the aid of his colleagues he conducted a study of optical materia and light sources for the vacuum ultraviolet. He is a member of American Physical Socie and American Astronomical Society. *Subject Headings:* **1. Biography of Richard Tous 2. Atmospheric optics 3. Tousey, Richard.**—*A.H.K.*

12.11–72 551.5:

†Körber, Hans-Günther, **Über Alexander von Humboldts Arbeiten zur Meteorologie u Klimatologie.** [Concerning Alexander von Humboldt's meteorological and climatologi works.] (In: Akademie der Wissenschaften, Berlin, **Alexander von Humboldt, 14.9.176 6.5.1859: Gedenkschrift zur 100. Wiederkehr seines Todestages.** Ed. by Alexander v Humboldt-Kommission of the Akademie. Issued Berlin, Akademie-Verlag, **1959.** p. 29 335. 198 foot-refs.) **DLC** (Q143.H9A37)—The lasting results of HUMBOLDT'S investigatio

on meteorology and climatology are presented. These are: definition of climate; mean horizontal and vertical temperature distribution with the first yearly isothermal map of the earth; atmospheric pressure measurements; tropical seasons; solar and real climate; some problems of atmospheric physics, as composition of the atmosphere, oscillation of stars, nightly sound increase, hail formation and, finally, his influence on the organization of meteorological observations. *Subject Headings:* **1. Biography of Alexander von Humboldt 2. Historical climatology research 3. Cartographic research 4. von Humboldt, Alexander.**—*O.T.*

12.11–73 551.46:92

†Stocks, Theodor, **Georg Wüst und seine Stellung in der neueren Ozeanographie.** [Georg Wüst and his place in modern oceanography.] *Petermanns Geographische Mitteilungen*, Gotha, 104(4):292–295, **1960.** 94 refs. **DLC**—The development of oceanography as a science during the past 90 years and WÜST'S career in oceanography beginning with his training under ALBRECHT PENCK and ALFRED MERZ are outlined, Wüst's continuation of the "Meteor" expedition and his role in the publication of its results, his participation in the planning of the "Willebrod Snellius" expedition, his participation in the "Altaer" expedition which studied the Gulf Stream, etc. are cited, and a complete list of Wüst's publications is given. *Subject Headings:* **1. Biography of Georg Wüst 2. Oceanographic research 3. Wüst, Georg.**—*I.L.D.*

12.11–74 551.5:92

Skliarov, V. M., [**Obituary of**] **Krichak, O. G.; Belolikov, A. M.; Dergach, A. L., Popov, I. A.; Samushkov, V. I.; Smirnov, A. Z.; Kostka, O. and Popp, G. Kh.,** *Meteorologiia i Gidrologiia* Moscow, No. 10:59–63, Oct. **1960.** photos. **DWB, DLC**—Brief biographical sketches are presented of the above meteorologists who died in a fire which swept the Mirny Observatory (Antarctica) on Aug. 3, 1960. O. KOSTKA was a member of the Czechoslovak Committee for the IGY and G. KH. POPP was a member of the Potsdam Observatory of the German Democratic Republic. *Subject Headings:* **1. Obituary of O. G. Krichak 2. Obituary of A. M. Belolikov 3. Obituary of A. L. Dergach 4. Obituary of I. A. Popov 5. Obituary of V. I. Samushkov 6. Obituary of A. Z. Smirnov 7. Obituary of O. Kostka 8. Obituary of G. Kh. Popp 9. Mirny disaster, Aug. 3, 1960 10. Mirny, Antarctica.**

BIBLIOGRAPHY

See also: **Obituary of Henryk Arctowski** (Zinkiewicz), 12.11–67; **Oceanog. in Canada, 1947–1957** (Hachey), 12.11–122.

12.11–75 551.46(47):016

†U. S. Joint Publications Research Service, **Soviet bibliography on oceanography.** Issued as its *JPRS* 3438, June 24, **1960.** 142 p. Price: $2.75 from Office of Technical Services, Wash., D. C. "Compiled from appropriate sections of the 3 Soviet Abstract Journals, July 1957–Jan. 1960: *Referativnyĭ Zhurnal: Geofizika, Referativnyĭ Zhurnal: Geografiia, and Referativnyĭ Zhurnal: Mekhanika.* **DWB** (551.46 U584so)—This bibliography compiled from three Soviet abstract journals lists about 1100 items covering various aspects of oceanography. The subject classification scheme divides the abstract titles into 9 groups: General, Bottom and Shore Relief; Composition, Physical and Chemical Properties of Water; Interaction of the Sea and Atmosphere; Dynamics and Thermodynamics of the Sea; Sea Ice; Acoustics of the Sea; Optics of the Sea, Biological Productivity; and Commercial Oceanography. *Subject Headings:* **1. Oceanography bibliographies 2. Soviet oceanographic research 3. Referativnyĭ Zhurnal.**—*I.S.*

12.11–76 53(043):016

†Marckworth, M. Lois (*comp.*), **Dissertations in physics.** An indexed bibliography of all doctoral theses accepted by American universities, **1861–1959.** Stanford, Calif., Stanford Univ. Press, **1961.** 803 p. 8418 theses listed (including Addenda). **DLC**—A comprehensive bibliography listing 8,418 titles of doctoral dissertations in physics accepted by American universities from 1861 through 1959. Although the listing is primarily that of pure physics many related subject areas are included; i.e., astrophysics, geophysics, meteorology and

oceanography. The book is divided into two parts: an alphabetical list by author and permutation subject index. The permutation subject index is alphabetical by the ke descriptor words in the title. The descriptor words are also supplemented with extensiv cross references to selected subjects. *Subject Heading:* **1. Doctoral dissertation bibliographie** —*E.Z.S.*

B. APPLICATIONS

B1. AERONAUTICS

See also: **Steady turbulence in jet stream** (Laĭkhtman, Shnaĭdman), 12.11–306.

12.11–77 551.508.43:551.547

Gracey, Williams; Jewel, Joseph W., Jr. and Carpenter, Gene T. (*all, Langley Res. Cente Langley Field, Va.*), **Measurement of the errors of service altimeter installations durir landing-approach and take-off operations.** *U. S. National Aeronautics and Space Administn tion, Technical Note,* D-463, Nov. **1960.** 18 p. 5 figs., table, 10 refs. **DWB, DLC**—T overall errors of the service altimeter installations on a variety of civil transport, military, a general-aviation airplanes have been experimentally determined during the routine landin approach and take-off operations. The errors of the installations of 196 airplanes durii 415 landing approaches and of 70 airplanes during 152 take-offs are presented herein. *Subji Headings:* **1. Altimeters 2. Altimeter errors.**—*Authors' abstract.*

12.11–78 551.509.5:551.509.317:629.13

Kaufmann, P. (*Kloten, Wetterdienst Flughafen*), **Ein Projekt zur objektiven Vorhersag** [A project for objective forecasting.] *Schweizerische Naturforschende Gesellschaft, Gene Verhandlungen,* 138:104–105, **1958.** eqs. **DLC** (Q67.S4)—A method is discussed for i proving weather forecasts, especially for jet flights. A mathematical formula applied by F. I Exner as early as 1906, and used by I. A. Kibel again in 1940, was chosen as the basic conce for a forecast. The more extensive method comprising the vertical layers of the atmosphe is preferred to the model method, because the latter is too unreliable in fixing the verti distribution of temperature and wind. The density of observations is considered as importa as the efficiency of the analysis. *Subject Headings:* **1. Objective forecasting methods 2. Fo casting for jet aircraft 3. Forecast improvement.**—*O.T.*

B2. ASTRONAUTICS

See also: **Conf. on Physical Chem. in Aerodynam. and Space Flight,** 12.11–6; **Tomorrow —the Moon** (Marcus, Marcus), 12.11–39; **Introduction to space** (DuBridge), 12.11–40; **Proposal for met. rocket** (Lockheed Aircraft Corp.), 12.11–163; **Missile research in upper atmos.** (Roy), 12.11–165.

12.11–79 551.507.362.1:551.521.17:535

†Tousey, R., **Observations of the solar ultraviolet spectrum from rockets.** *Internatio Council of Scientific Union, Brussels, Ninth Report of the Commission for the Study of So and Terrestrial Relationships.* Pub. Paris, **1957.** p. 35–40. table, 17 refs. **DWB**—A b résumé and discussion on solar spectroscopic data obtained by five Aerobee Rocket flig between Feb. 21, 1955 and May 3, 1957. These afford study of the spectrum of the sun a the distribution of the Lyman alpha line of hydrogen over the disc. Details of the flights presented in a table. The solar ultraviolet spectrum, emission lines and the distributio intensity over the solar disc are briefly discussed. In addition to providing 17 reference miscellaneous recent studies are recommended. *Subject Headings:* **1. Ultraviolet spec 2. Rocket observations 3. Aerobee rockets.**—*E.K.*

12.11–80 551.507.362.2:550.38

Dolginov, S. Sh; Zhuzgov, L. N. and Pushkov, N. V., **Predvaritel'noe soobshcheni geomagnitnykh izmereniiakh na tret'em sovetskom iskusstvennom sputnike Zemli.** [I

liminary information on geomagnetic measurements by the third Soviet artificial earth satellite.] *Iskusstvennye Sputniki Zemli*, Moscow, No. 2:50–53, **1958.** 4 figs., 2 refs. **DLC.** Transl. into English in *Artificial Earth Satellites*, N. Y., Plenum Press, **1960.** Vol. 2:63–67. **DWB**—The large number of instruments on the artificial earth satellite rendered difficult the exact measurement of the potential of the magnetic field owing to the magnetic deviations produced by the instruments. Accordingly magnetic measurements were made by means of a magnetometer with magnetically saturated elements which oriented themselves automatically according to the magnetic field. Magnetometers of this type are relative instruments and are inferior in precision to the proton precession magnetometer. The range of measurements of this instrument is equal to 48,000 γ. The rate of operation of the servosystem is 40–45 degrees/sec. Graphs of two magnetometer elements characterizing the angular displacement of the body of the satellite show that the satellite completed a precessional movement in a period of $t=136$ sec, and it rotated about its own axis with a velocity of about 0.36 degrees/sec. The curves of the magnetic field, measured directly by a magnetometer over a trajectory 23 min. in duration, with an altitude range of 250–750 km, indicate that the magnetograms from the satellite represent smoothly varying curves modulated by a magnetic interference intimately associated with the body of the satellite. The period of modulation equaled the period of precession. Since the maximum value of the magnetic deviation due to the magnetism of the satellite apparatus was 3000 γ, the magnetometer actually measured the potential of the earth's magnetic field and the projection of the vector of magnetic interference in the direction of the earth's field. Owing to the precession of the satellite the value of the projection varied periodically in magnitude and sign so that the principle part of the magnetic interference could be excluded. *Subject Heading:* **1. Satellite geomagnetic field measurement techniques.**—*I.L.D.*

B3. AGRICULTURE

See also: **Met. and climat. with element of agromet.** (Kiriakov, Todorov), 12.11–9; **U.S.D.A. radiological training manual**, 12.11–45; **Climate diagrams** (Walter, Lieth), 12.11–46; **Phenology of Spain** (Ottmar), 12.11–160; **Climatic control of land utilization** (Mason), 12.11–186; **Chem. of air, soil and plants** (Lauscher), 12.11–187; **Heat balance of soil beneath crops** (Monteith), 12.11–262; **Leaf moisture meas. for plant pathology** (van Eimern), 12.11–321; **Met. instrument in growing of greenhouse vegs.** (Szahin), 12.11–379.

12.11–81 551.586:581.543 551.506.8

†Conrad, C., **Über Schwankungen der Vegetationsperiode und über Variationen ausgewählter phänologischer Phasen von Kulturpflanzen.** [Variations in the vegetative period and in selected phenological phases of cultivated plants.] *Angewandte Meteorologie*, Berlin, 3(7):193–205, June **1959.** 10 figs., 2 tables, 55 refs. **DLC**—The fluctuations in the beginning and end and the total fluctuation of the vegetation period have been investigated for a period of 98 years between 1854–1953 (except 1891 and 1892). The contents of this study include the following: the fluctuation of the beginning and end of the vegetation period and its duration; blossoming date of the snowdrop as a function of winter precipitation and the variation of atmospheric temperature; blossoming date of snowdrop as a function of heat use which is expressed by means of the Blunck hyperbolic function represented in the form $\bar{T}=c+c_2(1/t)$, ($\bar{T}$=mean temperature during the duration of development in days t; c_2=sum of temperatures $>c_1$ up to the end of duration of development). By the method of least squares $c_2=(\bar{T}-c)t$; also $c_1=(\Sigma T_2-\Sigma T_1/t_2-t_1)$. For 31 year data of Wernigerode $\bar{T}=4.0+(244/t)$ expresses the relationship between the beginning of snowdrop blossoming and mean temperature. By means of a similar formula, the beginning of blossoming, the harvesting and length of maturation of winter rye is investigated. Also, the relationship between precipitation and ripening time for winter rye was investigated and an equation expressing it is presented. *Subject Headings:* **1. Vegetation period variations 2. Winter rye ripening time 3. Phenology.**—*I.L.D.*

12.11–82 551.586:63:061.3

Penman, H. L., **Weather problems in agriculture.** *Nature*, London, 187(4742):995–996, Sept. 17, **1960.** 3 refs. **DWB**—This paper gives a summary of four papers presented during the second morning (July 1) of the summer meeting of the Royal Meteorological Society at

Queen's College, Dundee. The first two papers **Weather in wheat** by Penman and Long (12.7–82, July 1961, *Met. Abs.*) and **The carbon dioxide flux over a field of sugar beet** Monteith and Szeicz (*see* 12.3–260, March 1961, *Met. Abs.*) have been published in the *Ro Meteorological Society Quarterly Journal*, 86:16, 1960 and 86:205, **1960,** respectively. T third paper **Radiation climatology** was presented by G. J. Day (*Meteorological Office, E dalemuir*). He had used observed values of solar radiation at various stations in the Brit Isles to compute the constants in the equation for computing radiation values from the ma mum possible duration of sunshine and the radiation which would be received without atmosphere. Charts of mean monthly radiation values for northwest Europe have b prepared. The fourth paper **Wind-breaks—some physical effects** was read by R. W. Glo (*Met. Off., Edinburgh*) and consisted of a world-wide review of knowledge on this subj *Subject Heading:* **1. Agricultural meteorology.**—*R.B.*

12.11–83 551.586:632.9:633.

*Post, J. J., **Een nieuw onderzoek naar de samenhang tussen het weer en het optre van aardappelziekte.** [A new investigation on the relation between the weather and outbreak of late potato blight.] *Netherlands. Meteorologisch Instituut, Wetenschappe Rapport, W.R.* 59-5 (III-237), De Bilt, **1959.** 47 p. 10 figs., 14 tables, 4 refs. Min **DWB**—Account of results of experiments made during the years 1957 and 1958 on experime fields in order to study the relationship between meteorological factors and the outbreak potato blight and to use the results for testing the intrinsic value of some of the present warn methods. These experiments were made in several countries: circular experiment fields w set up in 1957 and 1958 in the Netherlands (De Bilt), Yugoslavia (Ljubljana) and Germ (Munich, Grosz-Lüsewitz and Brunswick). The author describes these various experime fields; besides phenological observations a great number of meteorological data were collec Similar experiments had already been made in 1956 in the Netherlands and had led to establishment of new criteria fixing the outbreak of potato blight. These criteria, ca biological criteria, are: a) A period of 6 out of 7 successive three-hourly observations, wit dew point difference equal to or less than 4°C, followed by: b) A period of 5 consecutive th hourly observations, with a dew point difference equal to or less than 3°C. c) A minim temperature during the second night not less than 8°C. (Periods a and b include two nigh The criteria were tested in the experiments of 1957 and 1958 and gave the best result comparison with the criteria of Van Everdingen, Post-Richel, Thran and Uhlig. best results were obtained when spraying was carried out as soon as possible after the wea conditions fulfilled the biological criteria. *Subject Headings:* **1. Potato blight epidemio 2. Potato blight forecasting.**—*A.V.*

12.11–84 551.586:63:061.3(

Riley, J. A. (*U. S. W. B., Stoneville, Miss.*); Kish, A. J. and Measells, J. W. (*U. S. W. B., Jackson, Miss.*), **Mississippi Delta agricultural weather project: a Wea Bureau pilot project.** *Weatherwise*, Boston, 13(3):106–109, June **1960.** 4 figs. **DWB**— project has a four-point program: specific forecasts for agriculture, specialized observat of use to agriculture, a rapid means of communicating weather information to the farmer, a research program to relate weather information to agricultural needs. Participant stat are Jackson, Vicksburg, Memphis, and the Delta Branch Experiment Station. *Su Headings:* **1. Agricultural weather projects 2. Mississippi.**—*E.Z.S.*

12.11–85 551.586:633

Stallings, James L. (*N. Mex. State Univ.*), **Weather indexes.** *Journal of Farm Econo* 42:180–186, Feb. **1960.** 3 tables, 4 refs. Photostat of separated pages. "Article re some results of the author's Ph.D. thesis, **Indexes of the influence of weather on agricul output,** Michigan State Univ., **1958.**" **DWB** (M:631.5 S782we)—This paper presents ind of the influence of weather, constructed for corn, oats, barley, wheat, soybeans, cotton tobacco. Also presented are the indexes of the influence of weather on various aggre measures of agricultural production and yield (1900–1957) in the U. S. In addition estim parameters for the regression of the residuals about an eleven-year moving average of spec U. S. average yields and of aggregate indexes on the corresponding computed weather ind

are tabulated. The text discusses the procedure and assumptions for constructing the indexes. Evaluation of the indexes is also discussed. *Subject Headings:* **1. Weather indexes 2. Weather effects on crops 3. United States.**—*I.S.*

12.11–86 551.586:551.577:551.573:633.11

Brown, Merle J., **The relation of weather factors to the yield of winter wheat in Box Elder County, Utah.** *Monthly Weather Review*, Wash., D. C., 87(3):97–99, March **1959.** 2 figs., table, 11 refs. **DLC**—The author describes the construction of a multiple linear regression equation that relates the yield of winter wheat to "effective precip." during the months of September plus October (X_1) and May plus June (X_2). The equation is $Y=8.8+1.67X_1+1.85X_2$ where Y=estimated annual yield of winter wheat. The addition of other variables to the regression equation such as effective precip. during the previous crop year, winter minimum temp. and effective precip. for the current crop year did not improve the results significantly. *Subject Headings:* **1. Winter wheat yield 2. Weather effects on winter wheat yield 3. Effective precipitation 4. Box Elder County, Utah.**—*I.L.D.*

12.11–87 551.586:633.18

Kiss, István, **A rizs barnulásos betegségének (bruzone) problémája és az időjárás.** [Browning of rice ("brusone") and the weather.] *Időjárás*, Budapest, 63(3):167–172, May/June, **1959.** table, 16 refs. Hungarian and Russian summaries p. 167. **DLC**—The disease of rice known as brusone (browning of rice) has been found to be related to various biological disorders. The catastrophic brusone damages in 1955 in areas situated far apart proved a significant direct and indirect influence of weather conditions. The sudden cooling in summer and fog are among the causes damaging the rice indirectly. The author's synoptic meteorological analysis showed a connection between the direct damages and the cyclonic weather. Under these circumstances the condition of the soil may be shifted in an aneorobic direction releasing the poisonous gas H_2S; on the other hand the vitality and virulence of the fungi may be increased. *Subject Headings:* **1. Rice browning weather 2. Weather effects on rice 3. Brusone damage to rice.**—*Transl. of authors' summary* (*E.K.*).

12.11–88 551.501.9:551.43:63(481) 551.586:633.3

Lauscher, Friedrich, **Bericht über agrarmeteorologische Untersuchungen einer norwegischen Gebirgsstation.** [Report on agrometeorological research at a Norwegian mountain station.] *Wetter und Leben*, Vienna, 12(5/6):110–113, **1960.** table. German and English summaries p. 110. **DLC**—A brief report on the research of H. S. Höydahl at the biological mountain station, Sörnesset, Norway, in which in addition to the customary meteorological data, data on the duration of sunlight, water temperature and radiation are given. Observations and notes of a bioclimatic nature are included. As an illustration of the type of data, gives daily variation of lettuce growth in relation to the bioclimatic factors is given. *Subject Headings:* **1. Agrometeorological research 2. Bioclimatological observations 3. Lettuce growth factors 4. Norway.**—*E.Z.S.*

12.11–89 551.521.16:535.2:577.1

Davidson, J. L. and Philip, J. R. (*both, Div. of Plant Industry, CSIRO, Australia*), **Light and pasture growth.** *UNESCO, Arid Zone Research*, 11:181–187, pub. **1958.** 10 figs., 18 refs., 14 eqs. French summary p. 186. **DWB** (M84 US8cL)—A quantitative analysis of light-foliage growth relationships which suggests means of assessing agricultural potential and the efficiency of rival cultural practices in such conditions where water is not a limiting factor. *Subject Headings:* **1. Light-foliage growth relationships 2. Pasture management.**—*E.Z.S.*

12.11–90 551.521.16:581.14

Black, J. N. (*Waite Agricul. Res. Inst., Univ. of Adelaide*), **Light intensity and plant growth.** *UNESCO, Arid Zone Research*, 11:178–180, pub. **1958.** 15 refs. French summary, p. 180. **DWB** (M84 US8cL)—A general discussion and review of light intensity and the total amount of light energy available to the growing plant. It is pointed out that while restrictions in plant growth in arid and semi-arid areas are due to lack of soil moisture, other factors may also be involved. High light intensity, high temperature, low humidity and low soil moisture

are so highly interrelated that their separate effects on plant growth can only be determin under controlled conditions. *Subject Headings:* **1. Light intensity effects on plant grow 2. Microclimatology of plants.**—*E.Z.S.*

12.11–91 551.5:63(584.6):0

Kulik, M. S. and Sagatovskiĭ, N. V., **O nauchnykh trudakh po agrometeorologii Kasak skogo nauchno-issledovatel'skogo gidrometeorologicheskogo instituta.** [Scientific ag meteorological work of the Kazakh Scientific Research Hydrometeorological Institut *Meteorologiia i Gidrologiia*, Moscow, No. 10:51–55, Oct. **1960. DWB, DLC**—The auth review critically the contents of various publications on agroclimatology issued by the Kaza Scientific Hydrometeorological Institute during 1953–1959. Two of the papers that a summarized and evaluated are: **Characteristics of the soil moisture supplies under the princi agricultural crops of the grain regions of Kasakhstan** by A. D. Kopyt and **Agroclimatic ba of the dates of spring field operations in the regions of Kazakhstan where the virgin lands cultivated** by I. F. Samokhavalov (both in *Alma Ata, Kazakhstan. Nauchno-Issledovatel's Gidrometeorologicheskiĭ Institut, Trudy*, No. 4, **1955**). In general, sufficient attention to cultivation of spring wheat has not been given in the Institute's *Trudy*. Much more extens have been the articles on the agroclimatic conditions of pasture vegetation and ani raising. Methods have been developed for forecasting the accumulation of pasture vegetati determination of the suitability of grass planting on the basis of spring soil moisture conte the agrometeorological factors influencing sheep pasturing, etc. Articles dealing with th subject include the following: **Solar radiation as a zooclimatic factor** by N. A. Koniukhov A. I. Chekeres (*see* 11.5–51, May 1960, *Met. Abs.*), **Climatic conditions of winter pasturing sheep on the pastures of Kazakhstan** by A. P. Fedoseev (*Alma Ata, Kazakh. Nauch.-Issle Gidromet. Inst., Trudy*, No. 13, **1959**), etc. The general inadequacy of many of the pa published, the editing of the *Trudy*, etc., are criticized. *Subject Headings:* **1. Agrometeo logical publications 2. Kazakh Scientific Research Hydrometeorological Institute 3. Kaza S.S.R.**—*I.L.D.*

B4. FORESTRY

See also: **Light meas. in forests** (Roussel), 12.11–172; **Evapotrans. of forest stands on clayey soils with high groundwater-table** (Holstener-Jørgensen), 12.11–361; **Radiation intercepted by trees in orchards, Netherlands** (Ferguson), 12.11–377.

12.11–92 551.515.2:551.556.1:634.94(72

Wadsworth, Frank H. and Englerth, George H., **Effects of the 1956 hurricane on forest Puerto Rico.** *Caribbean Forester*, Rio Piedras, Puerto Rico, 20(1/2):38–51, Jan./June 1 2 figs., 5 tables, 7 refs. **DWB** (M15.3 W124ef)—In addition to reporting on the effect Hurricane "Betsy," the report describes its track and characteristics in Puerto Rico. Hu cane "Betsy" hit Puerto Rico near Maunabo and left near Camuy. Its path, as plotte radar, is shown diagrammatically. Recorded maximum wind velocities accompanying hurricane were 92 mi per hour at San Juan and 115 mi per hour at Ramey Air Force B 13 mi southwest of the path. The maximum rainfall measured on August 12 was 8.7 The pattern of rainfall for selected stations is shown. *Subject Headings:* **1. Hurricane eff on forests 2. Hurricane "Betsy" (1956) 3. Hurricane tracks, Puerto Rico 4. Puerto R** —*E.Z.S.*

B5. MEDICINE

See also: **High altitude balloon flight obs.** (Simons), 12.11–162.

12.11–93 551.586:551.588.7:312.26(443.

*du Mesnil du Buisson, Étienne, **Première contribution à l'étude de l'influence du d d'urbanisation et du déroulement des saisons sur les taux de mortalité dans la région I sienne.** [First contribution to the study on the influence of the degree of urbanization an seasons on mortality in the Paris area.] Issued **1957.** 144 p. 10 tables, numerous ch 19 refs. At head of t-p.: Secrétariat d'Etat à la Reconstruction et au Logement, Dire de l'Aménagement du Territoire, Service de l'Aménagement de la région Parisienne. **DW**

Utilizing the data of death certificates issued in the Paris region during the period 1944–1955, the author has attempted to determine the effect of season upon the incidence of death from various diseases, the role of urbanization in deaths resulting from particular diseases and to what extent the increased mortality from various diseases in Paris as compared with the countryside can be attributed to atmospheric pollution. The procedure is described in detail and the results of analysis are presented in graphs and tables. Death certificates were found more numerous in winter than summer for grippe, other respiratory diseases, pulmonary tuberculosis, arterial hypertension, diabetes, senility, infant diseases, etc. Deaths in Paris were higher than in its environs for diseases of the coronary arteries, diabetes, nephritis, arterial hypertension, etc.; in the environs deaths were higher for diseases of the arteries, pulmonary tuberculosis, malignant tumors of the stomach, heart disease—other than coronary disease, etc. The average winter increase in deaths for different diseases in Paris and in the countryside indicates that for some diseases the greater increase in Paris may be due to increase in oxydes of carbon in the air. *Subject Headings:* **1. Atmospheric pollution effects on mortality 2. Urban effects on mortality 3. Seasonal effects on mortality 4. Paris, France.**—*I.L.D.*

12.11–94 551.586:551.542:616.2–002.5

*Nemoto, J.; Koike, Y. and Kawakami, T., **On the relations between T.B. hemoptysis and pressure pattern.** *Meteorological Society of Japan, Tokyo, Journal*, Ser. 2, 38(1):22–26, Feb. 1960. 2 figs., 6 tables, 4 refs. In Japanese; English summary p. 22. **DWB, DLC**—In this paper the relations between T.B. hemoptysis and pressure pattern as a synthesis of meteorological elements are studied statistically. T.B. hemoptysis related to meteorological conditions is classified as + and ± types; it was found that each type corresponds to a special kind of pressure pattern. Further, detailed studies were made on this relationship as to summer thunder-storm and the pressure phase at a single point. *Subject Headings:* **1. T.B. hemoptysis 2. Pressure pattern-tuberculosis relationships.**—*Authors' abstract.*

12.11–95 551.586:551.524:612.014.43

†Mirchev, M. A., **Opyt primeneniia sovremennykh fiziologicheskikh metodov issledovaniia dlia izucheniia reaktsii organizma na mikroklimat.** [Attempt at an application of modern physiological methods of investigation to the study of body reaction to microclimate.] *Leningrad. Sanitarno-Gigienicheskiĭ Meditsinskiĭ Institut, Trudy*, 25:8–44, 1956. 10 figs., table, numerous refs. **DLC** (R95.L443)—A long, detailed exposition of methods used in measuring skin temperature, reflexes and body reaction to hot environment, using various temperature base from 14°C to 25°C. Not only instrumental records at these various temperatures, but 1036 verbal reports from 384 people indicate reactions to temperature in terms of comfort and other responses as follows:

	Comfort zone					
Ambient temperature °C	14–15°	16°	16–20°	18–20°	20.5	21
Number of cases	55	117	1033	893	85	644
Reporting	%	%	%	%	%	%
Very Cold	32	4	1	1	6	0
Cold	38	40	17	14	0	5
Comfortable	22	36	48	52	48	35
Warm	8	19	32	31	43	49
Very warm	0	1	2	2	3	11

It can be seen that there is a wide range in subjective response to identical temperature conditions. Hence the instrumental records are of great value in such investigations as speed of response to micrometeorological temperature changes, symmetry of changes in the body, etc. *Subject Headings:* **1. Comfort criteria 2. Temperature effects on comfort 3. Skin temperature measurement.**—*M.R.*

12.11–96 551.586:616.248:551.510.42(46)

†Alemany-Vall, R. (*Spain*), **Bioclimatological and biometeorological aspects of allergic diseases.** *International Journal of Bioclimatology and Biometeorology*, Leiden, Netherlands,

Vol. 2, (Pt. 4), **1958.** 7 p. 30 refs. **DWB**—The botanical aspects of allergy, in particu the distribution of pollen, are discussed in relation to geographical and meteorological a climatic conditions, special consideration being given to the annual pollen distribution Barcelona, Spain, the distribution of fungi spores in the air in Barcelona, and the relation atmospheric dust to asthma. Also the influence of atmospheric disturbances upon aller patients is considered. The harmful influence of sea air and of the low atmospheric pressu of depression centers upon asthmatics are pointed out. *Subject Headings:* **1. Atmosphe pollution and health 2. Pollen distribution 3. Weather effects on asthma 4. Barcelo Spain.**—*I.L.D.*

12.11–97 551.586:616.986.7(

Mochmann, Hanspeter (*Rostock Univ.*) and Hentschel, Gerhard (*Berlin*), **Leptospiros ein Beitrag zur Lokalbioklimatologie.** [Leptospirosis; a contribution to local bioclimatolog *Zeitschrift für Meteorologie*, Berlin, 13(1/6):29–31, Jan./June **1959.** fig., 12 refs. German a English summaries p. 29. **DWB, DLC**—Among the existent numerous leptospirae the epide occurrences of the so-called Schlammfeldfieber (*leptospira grippothyphosa*) are, as shown Kathe, to a high degree a function of climatic and meteorological parameters. In a stu jointly made with Hentschel the dependence of a 1955 *leptospira grippothyphosa* epidemic climatological and weather factors of the 1955 summer was again found to be real in the Osche leben region. In the following years, and particularly during the 1958 summer, no epide had been observed in the above named area. There were but a few single cases during period May to September 1958 (a total of three cases). The weather conditions of the ye 1955 and 1958 encountered during the intervals in question are compared, the results be used for an explanation of the absence of occurrences in the 1958 summer. *Subject Headin* **1. Medical meteorology 2. Infectious diseases 3. Oschersleben, Germany.**—*Auth abstract.*

B6. RADIOACTIVITY

See: **U.S.D.A. radiological training manual,** 12.11–45; **Radioactive meas. of hydrological regime** (Dimaksian), 12.11–180; **Chlorine-36 radioactivity in rain** (Schaeffer, Thompson et al.), 12.11–347; **Temp. distribution of snow with gamma ray radiation** (Tien), 12.11–356.

B7. INDUSTRY

See also: **Study on snow and ice, Japan,** 12.11–4.

12.11–98 551.578.4:551.556.6

Legget, R. F. and Schriever, W. R., **Realistic assessment of loads acting on structu with particular reference to snow and wind loads on buildings.** Reprint, p. 85–95 from *In national Association for Bridge and Structural Engineering, 6th, Stockholm, June 27–July* 1960. *Preliminary Publications.* 3 figs., 18 refs. English, French and German summar p. 94–95. Reprint issued as *National Research Council of Canada. Div. of Building Resea Technical Paper*, No. 99, July **1960.** Price: $0.25. **DLC, DWB** (690 N277t)—Canad studies of live loads on building, and a country-wide survey of snow loads and wind loads described in relation to their application in the National Building Code of Canada. Use made of detailed snow depth observations on the ground recorded during 1941–1950. snow loads given in the Code (1953) were calculated from the maximum recorded snow de on the ground, using as assumed average specific gravity, plus the weight of the maxim 24 hour rainfall during March. From these figures the included map was prepared, gi snow loads for a horizontal surface in the form of contour lines. Wind load requirement the National Building Code take into account three factors—gust velocity, the increase velocity with height and the shape of the structure. *Subject Headings:* **1. National Buil Code, Canada 2. Snow load on structures 3. Wind load on structures 4. Canada.**—*E.*

12.11–99 551.594.221:621.315:621.31

Gridley, J. H. (*Elec. Engineering Dept., Regent St. Polytechnic*), **The shielding of overh lines against lightning.** *Institution of Electrical Engineers, Proceedings, Pt. A*, 107(34):3 335, Aug. 1960. 6 figs., 17 refs., 3 eqs. **DLC**—Most overhead transmission lines carry a

unning earth wires, one function of which is to shield phase conductors from direct lightning trokes. Published theories of shielding are incompatible with modern knowledge of lightning. he paper emphasizes the importance of the changes bound on the earth wire and phase onductor by the leader stroke. Equality of charges is taken as a condition under which oth wires are equally likely to be struck. For adequate shielding, the charge on the earth wire hould exceed that on the conductor. The charges are calculated from the field due to the eader, and it is shown that equality of charges corresponds to both wires lying on the same quipotential of the leader. The limiting position for protection is determined by the slope f the equipotential, and as this depends on the distance between leader and transmission line, he limiting value of which depends on the stroke current, the protection afforded is a function f stroke current. Calculation suggests that shielding is normally adequate for conductors n a wedge of semivertical angle 45° of which the apex line is the earth wire. *Subject Headings:* . **Lightning protection devices 2. Shielding of transmission lines.**—*Author's abstract.*

B8. RADIO COMMUNICATION

See also: **Index JE of the E layer** (Minnis), 12.11–108; **Reflexion of long radio waves equations** (Barron), 12.11–112; **Tropos. sounding by radar** (Kostarev), 12.11–195.

12.11–100 551.510.536:538.69:532.59

Bomke, H. A.; Ramm, W. J.; Goldblatt, S. et al., **Global hydromagnetic wave ducts in ne exosphere.** Fort Monmouth, N. J., U. S. Army Signal Research and Development Lab., 959. 7 p. 2 tables, 4 refs. Mimeo. **DWB** (M10.53 B696gl)—According to H. A. Bomke's ggestion in 1958, Berthold and Harris of USASRDL installed two sensible wire loop tations to initiate an earth magnetic field experiment to detect hydromagnetic waves in the pper ionosphere and exosphere. They measured the first exact time differences in the arrival f sudden commencements at different points of the world. By observations they arrived t three hypotheses: 1) the hydromagnetic waves at high altitudes are confined in ducts;) within these ducts the hydromagnetic waves travel along great circle paths; 3) the propaga- on modes in these ducts are the well-known transverse and longitudinal hydromagnetic wave odes. These hypotheses were experimentally proven. *Subject Headings:* **1. Hydromagnetic aves 2. Exosphere. I. Klemas, V.**—*K.C.*

12.11–101 551.501.4:551.510.62

Misme, Pierre, **Réflexions partielles dans l'atmosphère et propagation à grande distance, I, Mesures météorologiques.** [Partial reflection in the atmosphere and long distance propaga- on. Pt. 1, Meteorological measurements.] *Annales des Télécommunications*, Paris, 13(7/8): 09–214, July/Aug. **1958.** 11 figs., 7 refs. **DLC**—The author starts by giving a brief survey f the theories capable of explaining the electric field observed from a long distance outside ne visual zone. The idea is developed that each theory is valid for a certain particular tmospheric model. Afterwards he sets out the results of measurements taken in France and ther foreign countries, which show up layers characterized by sudden variations of the re- active index: he gives them the name of "feuillet" (leaflet). These "feuillets" seem to be in ermanent existence in all parts of the globe, but their characteristics vary according to their eteorological situation. *Subject Headings:* **1. Atmospheric structure 2. Refractive index.** *-A.V.*

C. ASTRONOMY AND ASTROPHYSICS

C1. ASTRONOMY

See: **Tools of the astronomer** (Miczaika), 12.11–17; **Perpendic. deviations and sea level determ.,' Bernese Alps** (Kobold), 12.11–29; **Richard Tousey, Frederic Ives medalist for 1960,** 12.11–71.

C2. ASTROPHYSICS

12.11–102 542.2:523.03

Nicholls, R. W. (*Univ. of Western Ontario, London, Ontario*), **Laboratory astrophysics.** *oyal Astronomical Society of Canada, Journal*, 53(3):109–116, June **1959.** 22 refs. **DLC**—

This is a description of the program of the Molecular Excitation Group, University of West Ontario. The aims of the research program are: to provide by experiment and theoret analysis information upon transition probabilities PUL for U→L spectral transitions which of importance in astrophysics, aeronomy, combustion and radiation chemistry and to st in the laboratory some of the basic physico-chemical collision processes by which such at and molecules can become excited and emit light. The research program is outlined brie An example of work in progress is a study of shock excitation in powdered solids. Result far obtained show a smooth relationship between change in mass of the average particle Mach number. The shock tube is being used as a laboratory tool for studying meteor phys *Subject Headings:* **1. Shock tube studies 2. Molecular excitation studies.**—*E.Z.S.*

12.11–103 535.242:52

van Albada, T. S. and Borgman, J. (*both, Kapteyn Astronomical Lab., Groningen, Net lands*), **A standard light-source for photoelectric photometry based on Čerenkov radiat** *Astrophysical Journal*, Chicago, 132(2):511–512, Sept. **1960. DWB, DLC**—The photoelec photometer of the Kapteyn Astronomical Laboratory has been equipped with a standard li source of unusual stability; a description of the light source is given. About 1 m C of St tium^{90} dispersed in silver is used. As a transparent medium "perspex" was used, imbed the Strontium^{90} source and having a thickness of 10 mm in the direction of the light path. photocurrent in a 1P21 at 110 mm from the source is about 4×10^{-8} amp. The ove dimensions of the standard light-source are conveniently small; it has been installed in filter slide of the photometer. The color of the light is very blue ($B-V=-0.2$), being m the result of the energy distribution in the Čerenkov spectrum; the ultraviolet absorp band of the perspex starts at about 3200 A. An important advantage of the light-so based on Čerenkov radiation is its immunity against external influences, such as tempera and light. *Subject Headings:* **1. Čerenkov radiation 2. Photoelectric photometry.**—*E.Z.*

12.11–104 551.583.7:52

Chamberlin, Rollin T., **Geological evidence on the evolution of the earth's atmosph** (In: Kuiper, G. P. (*ed.*), **The atmospheres of the earth and planets.** Rev. ed. Chic., U of Chicago Press, **1952.** p. 248–266. 6 tables, figs., 15 refs.) **DWB**—Neither the mo globe hypothesis nor the accretion hypothesis explain satisfactorily the origin of earth' mosphere. But the record shows that the climatic and atmospheric conditions of geologic time have not been very different from those of later geologic history. Presum the earth's atmosphere has fluctuated in composition from time to time. Vulcanism i chief supplier of gases to the atmosphere. Water vapor and CO_2 are the most abun volcanic gases. The uncombined oxygen of the air must come from outside the lithosp Photosynthesis seems adequate to liberate all the oxygen needed; finally, there is the possi of gases from extra-terrestrial sources. *Subject Headings:* **1. Origin of Earth's atmosp 2. History of Earth's atmosphere 3. Paleoclimatology.**—*E.Z.S.*

C3. SUN—MOON—ECLIPSES—METEORS

Sun

12.11–105 52

Mursalimova, G. G., **Sviaz' mezhdu shirinoĭ zony piatnoobrazovaniia i intensivn solechnoĭ deiatel'nosti.** [Relation between the width of the zone of sunspot formation intensity of solar activity.] *Akademiia Nauk UzSSR, Izvestiia, Ser. Fiziko-Matem Nauk*, No. 4:77–83, **1957.** 4 figs., 3 tables, 4 refs., eq.—For each cycle of the sunspot p 1874–1952, the author constructed structural diagrams of sunspot forming zones upon w all sunspot groups within a given cycle differentiated according to intensity were pl according to time of passage through a central meridian (abscissa) and heliographic lat (ordinate). The distribution of groups of spots within the sunspot formation zone i uniform; near the epoch of minimum zone width approaches zero while during the max it reaches its greatest value. The relationship between the width of the zone and int of solar activity is manifested by comparing the mean width of the sunspot zone, com

for each cycle on the basis of differences between maximum and minimum latitudes taken from the structural diagrams of spot forming zones for equal semi-annual intervals, with an index of intensity of the sunspot formation process, taken as the height of the maximum cyclical curve of the area H. The mean width of the zone, D, and the height of the maximum, H, are related by the equation $D=14.6+0.005u\ H$. With increase of the width of the zone from minimum to maximum the dispersion of the sunspots varies throughout the extent of the cycle. The limiting latitudes of boundaries of the zones increase and decrease so that sunpot forming zones manifest pulsations. The characteristics of these pulsations are discussed with the aid of graphs. An examination is made of the relationship between these pulsations and the pulsations of the 11-year cycles of solar activity according to the mean annual value of the area of the sunspots, especially according to the smoothed values of this index for the synodic reversal. *Subject Headings:* **1. Sunspot activity 2. Sunspot forming zones.**—*I.L.D.*

12.11–106 523.75

Izsak, Imre G., **Bewegungen in Sonnenprotuberanzen, III, Strömungen in der aufsteigenden Protuberanz vom 13. Juli 1950.** [Movements in solar prominences, Pt. 3, Currents in the eruptive prominence of July 13, 1950.] *Zeitschrift für Astrophysik*, Berlin, 46:203–216, **1958.** 7 figs., table, 3 refs. Summary in English p. 203. **DLC.** Reprinted as *Zurich. Eidgenössische Sternwarte, Astronomische Mitteilungen*, No. 217. **DLC**—Based on a series of photographs taken by WALDMEIER in Arosa, the motions of an eruptive prominence have been examined in detail. The different stages of the phenomenon, are illustrated by figures the trajectories and the velocity-curves. From these figures it is evident that the motions are very complicated. According to their behavior the 77 knots that have been measured can be divided into eight classes (denoted by capital letters from A to J), so that within a single class the motions show common features. The mean velocities and accelerations measured along the trajectories have been compiled in the table. *Subject Heading:* **1. Solar prominences.**—*Author's abstract.*

12.11–107 551.521.67:550.386.6

Paghis, Irvine; May, Catherine A. and Jelly, Doris H. (*all, Radio Physics Lab., Defence Res. Telecom. Estab., Shirley Bay, Ottawa, Ont.*), **Hydromagnetic pulsations in the Sun-Earth atmosphere.** *Canada. Defence Research Telecommunications Establishment, Publication*, No. 50125, March **1960.** p. 27–37. 6 figs., table, 4 foot-refs. **DWB** (M21 S989pro)—The upper atmosphere exhibits various types of disturbance, many of which are known to be causally related. The planned program of the recently formed Synoptic Studies Section entails a comprehensive survey of known types of upper atmospheric disturbance and associated phenomena, together with detailed examination designed to establish the parameters most pertinent for their comparison. Emphasis is placed on the analysis of discrete, rather than averaged, disturbance sequences. The philosophy governing the studies are presented, with preliminary conclusions on one aspect. The latter concerns the advantages and limitations inherent in the synoptic use of K, the geomagnetic range variation index, as a measure of the flux of solar particles. *Subject Headings:* **1. Hydromagnetic pulsations 2. Geomagnetic range variation indexes.**—*Authors' abstract.*

MOON

See: **Bibliog. on Planets and Moon,** p. 2282; **Structure of Moon's surface** (Fielder), 12.11–15; **Tomorrow—the Moon** (Marcus, Marcus), 12.11–39.

ECLIPSES

See: **Atmos. ozone invest. by photometry of lunar eclipses** (Fesenkov), 12.11–200; **Amount of ozone during solar eclipse, April 1958** (Yamasaki), 12.11–203.

METEORS

See: **Rainfall and meteor showers relationships** (Jenkinson), 12.11–338.

D. OUTER ATMOSPHERE

D1. IONOSPHERE

12.11–108 551.501.42:551.510.535:551.594.

Minnis, C. M. (*R.R.S., Slough*), **Valeurs journalières de l'indice J_E de la couche** [Daily values of the index J_E of the E layer.] *International Scientific Radio Union, Brusse Bulletin d'Information*, No. 120:12–17, March/April 1960. 3 tables. **DLC**—The ionizati of certain constituents of the upper atmosphere is principally due to the arrival in these regio of ultraviolet radiation and X-rays emitted by the sun. In order to determine the intensi of both these types of radiation the degree of ionization in the normal E layer of the ionosphe is used. Tables of an index of J_E of the E layer were established by the author and G. Bazzard for the IGY. The daily values of the index J_E of the E layer are given in tabl The author shows that there exists a semi-yearly cycle in the value of J_E which has the sa phase in the Northern Hemisphere and in the Southern Hemisphere. *Subject Headin* **1. Ionospheric ionization 2. Ionospheric indexes 3. J_E index 4. International Geophysi Year, 1957–1958.**—*A. V.* Ⓢ

12.11–109 551.506.22:551.510.535:06

Beynon, W. J. G., **Comité de l'U.R.S.I. pour l'A.G.I.** [Committee of the URSI for t IGY.] *International Scientific Radio Union, Brussels, Bulletin d'Information*, No. 120:28– March/April 1960. **DLC**—Report of the meeting of the URSI Committee for the IGY h in Brussels on Sept. 1 to 3, 1959. Most of the time was devoted to a preliminary deb about the results obtained in ionospheric research during the IGY. The Committee review the program to supply the World Centers with the data concerning vertical incidence sou ings, ionospheric motion measurements, atmospheric radioelectric noise and whistlers. T Committee proposed to include in the IGY Calendar Record two ionospheric indexes, for the E region and another for the F_2 region. Arrangements have been made for the publi tion of the values of the ionospheric data and it is planned to publish in the Annals the d on absorption and ionospheric motions. A survey is given of the world-wide activities of Sub-Committee of Ionospheric Soundings. The resolutions taken in the course of this meet are appended; they concern the quantity and the analysis of the IGY data, the scient utilization of the World Data Centers, the future of the World Data Centers, the excha of ionograms, the long-period measurements of ionospheric motions. Two lists, append give the names of the stations which made absorption measurements and of those which m ionospheric motion measurements during a part of the IGY or of the IGC. *Subject Headi* **1. Ionospheric research during IGY 2. International Scientific Radio Union confere Brussels, Sept. 1–3, 1959.**—*A. V.* Ⓢ

12.11–110 551.501.7:551.510.535:0

International Scientific Radio Union, **Troisième Rapport du Comité des Sondages Io sphériques à l'échelle mondiale du Comité de l'U.R.S.I. pour l'A.G.I.** [Third report of World-Wide Ionospheric Sounding Committee of the URSI Committee for the IGY.] *Bulletin d'Information*, No. 120:52–102, March/April 1960. fig., 2 tables. **DLC**—The wo wide Ionospheric Sounding Committee of the URSI Committee for the IGY held its t plenary session at Brussels, on Aug. 27–Sept. 5, 1959. The principal object of this mee was to review the use of ionospheric soundings for geophysical purposes with special emp on the observations made during the IGY and the IGC, 1959. A large number of viewpo were examined and discussed and 16 recommendations were formulated. These concer utilization, the working and the future of the World Data Centers, the collection and scientific use of the data obtained during the IGY, the verification of data coming from world network, the programs of future work, the extension of the ionospheric stations and development of new techniques and new parameters. A table presents a statistical summa the large quantity of data during July 1959 and another table gives the location of the ver sounding stations in August, 1959. *Subject Headings:* **1. Ionospheric soundings 2. W Wide Ionospheric Sounding Committee meeting, Brussels, Aug. 27–Sept. 5, 1959.**—*A. V.*

12.11–111 551.510.535:551.594.12

Schmerling, E. R. (*Ionos. Res. Lab., Penn State Univ.*), **Height and thickness parameters for region F of the ionosphere.** *Journal of Geophysical Research*, Wash., D. C., 65(3):1072–1073, March 1960. **DLC**—It is suggested that useful height parameters may be obtained by measuring those heights when the electron densities are fixed submultiples of the maximum density, N_mF_2. . . . These are denoted as $n(0.9N_m)$, $h(0.5N_m)$. As a measure of layer thickness $T=h(09.N_m)-h(0.5N_m)$. Here T measures essentially the lower semithickness of F_2. *Subject Headings:* **1. F region height measurement 2. F region thickness measurement.** —*E.Z.S.* Ⓢ

12.11–112 551.510.535:621.396.1

Barron, D. W. (*Cavendish Lab., Univ. of Cambridge*), **The numerical solution of differential equations governing the reflexion of long radio waves from the ionosphere, Pt. 4.** *The Royal Society of London, Proceedings, Ser. A*, 260(1302):393–408, March 7, 1961. 15 figs., 3 tables, 17 refs. **DWB, DLC** (Q41.L8)—The previous papers in this series have described methods by which the differential equations governing the reflexion of long waves from the ionosphere may be solved with the use of an automatic digital computer, and have dealt with the application of these methods to some idealized ionosphere models. In this paper these methods are used in a comparative study of models which have been proposed for the day-time ionosphere in summer. The model whose theoretical reflecting properties most nearly agree with the experimental observations is found, and suggestions are made as to how it should be changed. A summary is given of the essential properties which an acceptable day-time ionosphere model must possess. The transition from day-time to night-time conditions in the ionosphere is also discussed, and it is shown that the sharp change in the reflexion coefficients can be accounted for qualitatively by the disappearance of a D-layer which might be present during the day at low level in the ionosphere. *Subject Heading:* **1. Ionospheric radio wave reflection 2. Long wave reflection.**—*Author's abstract.* Ⓢ

D2. COSMIC RADIATION

See: **High altitude balloon flight obs.** (Simons), 12.11–162.

D3. GEOMAGNETISM

See: **Geomag. meas.-third Soviet satellite** (Dolginov et al.), 12.11–80.

E. SOLID EARTH GEOPHYSICS

E1. GENERAL GEOPHYSICS

See also: **The Earth today: papers dedicated to Sir Harold Jeffreys,** 12.11–5; **Hole in the bottom of the sea: Mohole Project** (Bascom), 12.11–32; **Thickness of Earth's crust, Antarctica and surrounding oceans** (Evison et al), 12.11–56; **Physics dissertations** (Marckworth), 12.11–76.

12.11–113 551.241:525.35/37

†*Melchior, P. J., **Latitude variation.** *Physics and Chemistry of the Earth*, Vol. 2. N. Y. Pergamon Press, **1957.** p. 212–243. 7 figs., 2 tables, bibliog. p. 240–243, 50 eqs. **DWB** (551 P578); **DLC** (QC501.P53)—The motion of the instantaneous pole of rotation of the earth over its surface results in a variation in astronomically determined latitudes. These variations are caused by density, elasticity and viscosity of the earth's interior and by motions of masses on the earth (planetary air and ocean masses). Observational aspects, methods used internationally, general character of the motion of the pole, secular displacement of the mean pole, elastic deformations of the earth, Love's theory, theory of annual forced motion, comparison between analysis of observation and theory, and conclusions regarding the earth's interior and the laws of celestial mechanics, are reviewed in detail and an extensive bibliography presented. *Subject Headings:* **1. Latitude variations 2. Polar displacement 3. Geophysics.** —*M.R.*

12.11–114 551.15:550.4

†MacDonald, Gordon J. F. and Knopoff, Leon (*both, Inst. Geophysics, U. Calif. at L. A*
On the chemical composition of the outer core. *Geophysical Journal*, London, 1(4):284–29
Dec. **1958.** 2 figs., 6 tables, 37 refs., 2 eqs. English summary p. 284. **DWB, DLC**—T
average composition of the Earth is assumed to be the same as that of the chondritic meteorit
This assumption is consistent with the present rate of heat production in the Earth. A co
made up solely of iron-nickel is inconsistent with the chondritic model unless the ratio of t
abundances of (Fe+Mg)/Si is unity in the mantle. The condition (Fe+Mg)/Si=1 requir
that a major part of the mantle be made of material having the composition of pyroxene
pyroxene-garnet (eclogite). If the mantle is assumed to be made up of a 400 km shell of t
composition of eclogite underlain by a material of dunite composition, the chondritic mo
requires a core of composition $(Fe, Ni)_{1.6}Si$. The representative atomic number ($\bar{Z}$) has be
introduced to characterize compounds at moderately high pressures. From asympto
relations in the Thomas-Fermi-Dirac model, a basis is formed for the computation of $\bar{Z}$. Bu
LEN's density distribution gives $\bar{Z}$ for the outer core of about 22. The representative aton
number of $Fe_{1.6}Si$ is 22.8. The composition of the core deduced from equation of state arg
ments is thus consistent with the chondritic model of the Earth. The electrical conductiv
of $(Fe, Ni)_{1.6}Si$ should be a third to a tenth that of pure iron for conditions obtained in the co
Such a conductivity is consistent with the requirements of the dynamo theory of the magne
field. *Subject Headings:* **1. Earth's core 2. Chemical composition of earth's core.**—*Autho*
abstract.

12.11–115 531

Nedelkov, I. P., **Quick-acting models for interpretation of gravity anomalies.** *A*
Geophysica Polonica, Warsaw, 6(4):321–330, **1958.** 4 figs., 6 refs., 10 eqs. **DWB, DLC**
Mathematical models for interpretation of gravity anomalies, especially those with reac
changeable shape, are described in this paper. A method for a substantial speeding-up of
comparison between the model body anomaly and the disturbing body anomaly is also giv
Subject Heading: **1. Gravity anomalies.**—*Author's abstract.*

12.11–116 526.37:551.547.1

Tardi, Pierre (*Acad. of Sci., Paris*), **Calcul d'ensemble d'un réseau unifié des nivelleme**
européens. [General calculation of a unified network for European levelling.] *Internatio*
Council of Scientific Unions, ICSU Review, 1(4):160–178, Oct. **1959.** 3 figs.—The Int
national Association for Geodesy has undertaken the compilation of data from a single ho
geneous block of levelling networks consisting of as large a number as possible of Europ
countries, and for this purpose has set up the "Réseau Européen Unifié des Nivellemen
(R.E.U.N.). The author explains succinctly the organization of this European netw
constituting a part of each national network, and reviews the various problems it will h
to resolve. *Subject Headings:* **1. European levelling 2. Barometric levelling 3. Internatio**
Association for Geodesy.—*A. V.*

E2. SEISMOLOGY

See also: **Microstructure and macrostructure of elastic waves** (Ivakin), 12.11–30; **Thickness of Earth's crust, Antarctica and surrounding oceans** (Evison et al.), 12.11–56; **Excitation of storm microseisms** (Bukhteev, Andreev), 12.11–225; **Microseisms at a wave gauge station** (Santô), 12.11–229.

12.11–117 550.341.6:551.

Nishimura, Eiichi; Kishimoto, Yoshimichi and Kamitsuki, Akira, **On the nature of**
20°-discontinuity in the earth's mantle. *Tellus*, Stockholm, 10(1):137–144, Feb. 19
8 figs., table, 8 refs. **DWB, DLC**—The structure of the earth's mantle, mainly its upper p
having been investigated by the analysis of seismic waves of five Kamchatka-Kurile Isla
earthquakes of shallow focus and some others, the problems on the existence and propert
the 20°-discontinuity and the low-velocity layer in the mantle are discussed in some de
The time-distance graphs obtained in Japan are in fair agreement with Jeffreys-Bullen's T
(1939), and also the 20° discontinuity is considered to exist certainly at nearly the same de

as given by JEFFREYS. The amplitude relation observed at the epicentral distance near 20° between the direct wave propagating through the medium entirely above the 20°-discontinuity and the refracted wave penetrating down into that discontinuity is just the reverse of that commonly expected, that is, the former being small and the latter large, both for the P- and S-waves. Concerning this phenomenon some arguments are given. Moreover, the existence of a new discontinuity was ascertained at some depth below the 20° discontinuity, as deduced from the appearance of a prominent later phase. As to the existence of a low-velocity layer in the mantle, it is somewhat questionable at least in the form after Gutenberg from the analysis of seismic waves observed at the stations in Japan of the earthquakes of Kamchatka-Kurile Islands. But its existence is still probable in some forms, which is uncertain at present, at some depths below the Mohorovicic discontinuity. This problem will be postponed to a succeeding paper. *Subject Headings:* **1. Earth's mantle 2. Kamchatka-Kurile Islands earthquake analyses 3. Kamchatka, Asiatic U.S.S.R. 4. Kurile Islands, Asiatic U.S.S.R.**—*Authors' abstract.*

12.11–118 550.341.6:551.242

Nishimura, Eiichi; Kishimoto, Yoshimichi and Tanaka, Yutaka (*all, Geophys. Inst., Kyoto Univ.*), **Observed secular tilting motion of the ground which preceded the occurrence of several destructive earthquakes.** *Tellus*, Stockholm, 11(1):130–134, Feb. **1959.** 4 figs., table, 8 refs. **DLC**—Some details of tilting motion of the ground continuously observed for a long period with the aid of the highly sensitive, fused-silica tiltmeter of horizontal pendulum type at the Kamigamo Geophysical Observatory is described in this paper, with regard especially to the secular ground-tilting in connection with seismic activity in the surrounding area of the Observatory. It was consequently clearly ascertained, after the careful examination and perfect exclusion of various disturbing effects, that the ground commenced a characteristic tilting motion downward to the direction of the epicenter several months before the occurrence of the destructive earthquakes, and showed a recovering motion after the quakes, so far as the present cases of the five destructive earthquakes around the Observatory concern. *Subject Headings:* **1. Earthquake effects 2. Tiltmeters 3. Kamigamo, Japan.**—*Authors' abstract.*

12.11–119 550.341.1:550.342

Nanney, C. C. (*Dept. of Physics, Univ. of Chicago*), **Possible correlations between earthquakes and microseisms.** *Nature*, London, 181(4612):802–803, March 22, **1958.** 3 refs. **DWB**—Microseism data for three years and some three hundred earthquakes were analyzed. The study revealed that the microseism frequency begins to increase approximately 24 hrs before the occurrence of many large earthquakes. Various data analyzed showed that there is reason for believing that many of the so-called microseism storms may be correlated with earthquakes. Microseism data from the following stations were used: Japan, Guam, Hawaii, California, Missouri, Maryland, New York and Finland. *Subject Heading:* **1. Microseism-earthquake relationships.**

F. OCEANOGRAPHY—HYDROLOGY—GLACIOLOGY

F1. OCEANOGRAPHY

See also: **I.U.G.G. Assoc. of Phys. Oceanog., Toronto, Sept. 1957,** 12.11–7; **Perpend. deviations and sea level determ., Bernese Alps** (Kobold), 12.11–29; **Hole in the bottom of the sea: Mohole Project** (Bascom), 12.11–32; **Phys. geography of the seas** (Dietrich), 12.11–33; **Oceans** (Behrendt), 12.11–34; **Biog. of the sea** (Carrington), 12.11–35; **Atlas of oceanog. climate, Hawaiian Isl. region** (Seckel), 12.11–44; **Special problems of geog. of E. Antarctica** (Markov), 12.11–55; **Thickness of Earth's crust, Antarctica and surrounding oceans** (Evison et al.), 12.11–56; **Scientific exped. by Acad. Sinica** (Chu); 12.11–62; **Georg Wüst, his place in the new oceanog.** (Stocks), 12.11–73; **Soviet bibliog. on oceanog.,** 12.11–75; **North Sea problem** (Lauwerier), 12.11–296; **Banded reflections from the sea, Coral Beach, Fla.** (Rossman), 12.11–386.

12.11–120 551.46

Deacon, G. E. R. (*Natl. Inst. of Oceanog., Wormley, Surrey*), **International co-operation in marine science.** *Science Progress*, London, 48(192):667–672, October, **1960.** 2 refs.—

Oceanography has, unfortunately, often been regarded as a science of observation rather tha experiment. A vast amount of data is frequently collected without sufficient pre-planni and not enough time is made available for their examination. There has been a tenden for a too direct approach to problems of economic importance, in particular to fishery problem Much progress has been made in recent times and the tempo of the subject is increasin UNESCO initiated a marine sciences programme in 1955 and set up the International Adviso Committee on Marine Sciences. It has subsidized seminars and symposia, organized region groups and subsidized the International Association of Physical Oceanography. Other inte national bodies with an interest in oceanographic problems are the United Nations Food a Agricultural Organization, whose interest is in fisheries science, the International Aton Energy Agency interested in waste disposal problems, WMO and the United Nations Organiz tion itself whose interests include political and economical problems. The Internation Council for the Exploration of the Sea formed in 1899, the oldest inter-governmental organiz tion, is mainly concerned with fisheries research. There are a number of newer simil organizations. The International Association of Physical Oceanography was set up in 19 to promote studies carried out with the aid of mathematics, physics and chemistry. T International Union of Biological Sciences is also sometimes concerned with oceanograph The International Council of Scientific Unions set up a Special Committee on Oceanic Resear in 1957. *Subject Headings:* **1. Oceanography institutions 2. International co-operation oceanographic research.**—*R.B.*

12.11–121 551.46

National Research Council. Wash., D. C. Committee on Oceanography. **Ocean-wi surveys.** (Ch. 9 of its **Oceanography 1960 to 1970.**) Wash., D. C., National Academy Sciences—National Research Council, **1960.** 22 p. 4 tables. **DWB** (551.46 N277oc)— report prepared by the Committee on Oceanography of the National Research Council. T is the 9th chapter of a series of 12 which comprise the volume **Oceanography 1960 to 19** This chapter makes suggestions for an international cooperative ocean-wide survey which c be divided according to topics: 1) shape of the bottom and the carpet of sediment; 2) g magnetism, heat flow, gravity, seismic and crustal studies; 3) primary productivity, composit and distribution of plankton, and the larger forms of marine life; 4) distribution of wa properties such as temperature, salinity, density and sound velocity. The proposed progra the division of responsibility between nations, intercalibration of methods and exchanges data are discussed. Appendices contain estimates of ship time and man power needs, as w as a program recommended for the United States. *Subject Headings:* **1. Oceanographic surv 2. Oceanographic research programs.**—*E.Z.S.*

12.11–122 551.45:061.6(

†Hachey, H. B. (*Chief Oceanographer, Fisheries Research Bd. of Canada*), **Oceanogra in Canada 1954–57.** *International Union of Geodesy and Geophysics. Association of Phys Oceanography, Procés-Verbaux,* No. 7, pub. Göteborg, **1960.** p. 115–122. numerous r **DWB**—Oceanographic activity has been for the last ten years coordinated under the Canad Joint Committee on Oceanography with representatives of the Royal Canadian Navy, Fisheries Research Board, the Defense Research Board, the National Research Council a the Hydrographic Service, each with its specific responsibilities. The Associate Committee Geodesy and Geophysics, coordinating all geophysical research, is the national commit responsible for the care and development of this discipline. Reported are the activities un and associated with the Joint Committee, those under the Canadian Hydrographic Serv sea ice research, the Oceanographic Institute of the University of British Columbia, and Royal Society Committee on Oceanography. The references consist of an alphabetical lis oceanographic papers by Canadian authors. *Subject Headings:* **1. Oceanographic progr reports 2. Oceanography bibliographies 3. Canada.**—*O.T.*

12.11–123 551.465 5

Stommel, Henry and Arons, A. B. (*both, Woods Hole Oceanog. Inst., Woods Hole, Ma* **On the abyssal circulation of the world ocean, Pt. 1, Stationary planetary flow patterns c**

sphere. *Deep-Sea Research*, London, 6(2):140–154, Feb. 1960. 16 figs., 3 refs., 6 eqs. **DWB**—A treatment of stationary planetary flow patterns driven by source-sink distributions in a cylindrical tank (STOMMEL et al., 1958; *see* 10.3–223, March 1959, *Met. Abs.*) is extended to predict flow patterns which might be expected under similar circumstances on a rotating sphere. Flow patterns are sketched for various source-sink distributions and meridional and zonal boundary conditions. *Subject Headings:* **1. Stationary planetary flow patterns 2. Abyssal circulation 3. Oceanic circulation patterns.**—*Authors' abstract.*

12.11–124 551.465

Stommel, Henry and Arons, A. B., **On the abyssal circulation of the world ocean, Pt. 2, An idealized model of the circulation pattern and amplitude in oceanic basins.** *Deep-Sea Research*, London, 6(3):217–233, April 1960. 5 figs., 2 tables, 12 refs., numerous eqs. **DWB**—Stationary planetary flow patterns driven by source sink distributions in an ocean on the rotating earth were developed in Pt. I (*see* 12.11–123). These theoretical results are now used to construct a highly idealized model of the general abyssal circulation of the world ocean. The model is based on the postulation of the existence of two concentrated sources of abyssal waters (one in the North Atlantic and another in the Weddell Sea) and on a uniformly distributed upward flux of water from the abyssal to the upper layers as part of the mechanism of the main oceanic thermocline. Order of magnitude calculations based on this model lead to a variety of estimates of the time in which the deep water is replaced (from every 200 to 1800 yrs). Comparison of leading terms in the dynamical equations and equation describing the flux divergence of a tracer shows that there is a large range of lateral eddy coefficient which will influence the distribution of the tracer but not affect the dynamically determined planetary flow patterns. *Subject Headings:* **1. Oceanic circulation patterns 2. Abyssal circulation 3. Stationary planetary flow patterns.**—*Authors' abstract.*

12.11–125 551.556.8:551.465(266)

Stevenson, Robert E. (*Dir. of Inshore Res., Allan Hancock Foundation, Univ. of S. Calif.*), **Wind drift in the waters of the Southern California shelf.** *Water and Sewage Works*, San Marino, Calif., 107(4):146–150, April 1960. 2 figs., 14 refs. **DLC** (TD1.W3)—This report summarizes the role of wind in moving water over Southern California's mainland shelf. It is pointed out that the wind exerts its greatest influence on the surface of the sea so that here the current flows at an average of 2.5% of the wind velocity. No deviation of current direction from that of the wind usually occurs, except in the very near shore region where the shore influences both the direction and velocity of the water flow. The effect of the wind is readily apparent to depths of 50 ft, but the reaction of the water to the air stream decreases appreciably. Wind/current factors average 1.3% at 20 ft and 1% at 50 ft. *Subject Headings:* **1. Wind driven surface water 2. Southern California.**—*E.Z.S.*

12.11–126 551.463(263,718)

†Williams, Jerome; Johnson, E. R. Fenimore and Dyer, Albert C., **Water transparency observations along the east coast of North America.** *Smithsonian Miscellaneous Collections*, 139(10), Oct. 26, 1960. 181 p. 13 figs., 2 plates, 2 tables, 35 refs., 13 eqs. (*Smithsonian Institution, Publication*, 4391.) **DWB**—This report contains oceanographic data obtained during the years 1947–51 when the yacht "Elsie Fenimore" made a rather extensive survey of water transparency conditions along the east coast of North America from Labrador to the Gulf of Mexico, including some stations around Newfoundland and in the British West Indies. Though the data presented are admittedly far from complete and a number of other studies have been made of the area this study represents, from the geographical standpoint, the most extensive single piece of work done on the subject to date. Instruments and methods are described. Photographs and maps are included. *Subject Headings:* **1. Ocean water transparency 2. East Coast, North America.**—*E.Z.S.*

12.11–127 551.506.22:551.461.2

*Selitskaia, E. S., **K voprosu o sezonnom khode urovnia Mirovogo okeana.** [Seasonal variations in the level of the oceans of the world.] *Moscow. Gosudarstvennyĭ Okeanograficheskiĭ Institut, Trudy*, No. 53:104–115, 1960. 5 figs., 5 tables, 6 refs. Russian summary

p. 114–115. **DWB**—The seasonal variations of the water level of the oceans, as indicated b the data of IGY and by a supplementary series of observations, were investigated by determi ing the harmonic constants of annual and semiannual waves—the amplitudes (*Ham*) an phase angles ($K°$) of the solar year wave (*Sa*) and the solar semiannual wave (S_{sa}). Th analysis of the harmonic material leads to the conclusion that the seasonal variation of wat level has common features in different points of similar circulation zones. Within the limi of these zones the interannual variations of the seasonal variation are similar at all the point The analysis of the variation of steric levels was carried and for data for Murmansk an Tuapse by means of the formulas

$$Z_T = \int_{P_a}^{P_0} \frac{\partial \alpha}{\partial T} \Delta T dp, \qquad Z_s = \int_{P_a}^{P_0} \frac{\partial \alpha}{\partial S} \Delta S dp, \qquad Z_\alpha = \int_{P_a}^{P_0} \Delta \alpha dp$$

The curves of seasonal variation of steric levels obtained for stations of the same cross secti are similar. The difference in several variations of amplitude of steric heights from stati to station is associated principally with differences in depth of the hydrological stations. A analysis of four curves of variation of Z, Z_α, Z_s and Z_T indicates that the variations of ste level are most probably to be attributed to circulation depth. *Subject Heading:* **1. Sea le variations.**—*I.L.D. and author's summary.*

12.11–128 551.465:532.

Ertel, Hans, **Teoria mas regurosa de las olas.** [A more rigorous theory of wave *Beiträge zur Geophysik*, Leipzig, 69(4):240–244, **1960.** 3 refs., 30 eqs. French and Germ summaries p. 240. **DWB, DLC**—On the basis of hydrodynamic theory which regards s waves in a first approximation as oscillatory, two dimensional and rotational motions of ideal fluid, the author derives the expression $c = \sqrt{g\lambda/2\pi}$ for the velocity of propagation. H in reality the dynamics of waves are not so simple and wave height cannot be explained by theory of waves in an ideal fluid. It is shown that by a more rigorous treatment of hyd dynamic theory involving the introduction of turbulence into the ideal hydrodynamic equati it is possible to obtain an equation for calculating the height of waves: $h = \lambda\tau/4\pi^2 \cdot |P^\zeta|/\eta\, c$ where $h = 2/|\zeta|$ represents the height of a wave. *Subject Headings:* **1. Hydrodynamic wa theories 2. Ocean wave height calculation.**—*I.L.D.*

12.11–129 551.465:532.59(9

Jaeger, J. C. (*Austral. Natl. Univ., Dept. of Geophys., Canberra*), **Long ocean wav** *Australian Journal of Science*, Sydney, 23(1):4–9, July **1960.** 7 figs., 5 refs., 3 eqs. **DL** An analysis of long ocean waves based on observations at various recorder sites on Tasm Peninsula (indicated on the map) at different times in 1959. Surf beats (illustrating Tuck theory), wave records from Van Dorn and British National Institute of Oceanography corders, and various types of tide gages and wave recorders are illustrated. Examining possibilities of useful continuous observations, the preliminary work showed as the nor pattern of activity: a long wave forerunner (arising) traveling over a relatively calm sea, short period swell which generates surf beats. The long wave activity precedes the arr of the front by some hours. *Subject Headings:* **1. Long wave analysis 2. Ocean wa 3. Ocean wave measuring instruments 4. Tasman Peninsula, Tasmania.**—*O.T.*

12.11–130 532.593:551.

Grosch, C. E. (*Stevens Inst. of Tech., Hoboken, N. J.*); Ward, L. W. (*Webb Inst. of N Architecture, Glen Cove, L. I., N. Y.*) and Lukasik, S. J. (*Stevens Inst. of Tech., Hoboken, N.* **Viscous dissipation of shallow water waves.** *Physics of Fluids*, N. Y., 3(3):477–479, M June, **1960.** fig., 8 foot-refs., 2 eqs. **DWB**—All the data indicate that there is an attenua of shallow water gravity waves, considerably in excess of that predicted by the linear Navier-Stokes equations. The observed amplitude changes are greater than expected. difference between the observed and calculated amplitude attenuation coefficients is the re of the energy dissipation mechanisms that are not included in the theoretical model of linearized Navier-Stokes equation. These may be nonlinearities, boundary layer separa during part of the wave period, or boundary layer turbulence. The variation of the ampli

ttenuation coefficient K with wave Reynolds number R is shown graphically. *Subject Headings:* **1. Shallow water waves 2. Linearized Navier-Stokes equations.**—*E.Z.S.*

12.11–131 551.46.018:551.465:532.593

Liubanskiĭ, V. A. and Mersalov, V. G., **Iz opyta raboty s volnografom GM-16.** [Experience in the use of the GM-16 wave meter.] *Meteorologiia i Gidrologiia*, Moscow, No. 5:32–34, June **1960.** ref. **DWB, DLC**—Hydrologic measurement of Atlantic Ocean waves with the wave meter GM-16, developed by VILENSKIĬ and GLUKHOVSKIĬ, are described in detail. The apparatus automatically registers the height and period of the waves whether the ship is anchored or slowly drifting. The wave meter acts on hydrostatic principles and consists of: 1) pressure receiver with compensator, 2) float, 3) controlling switchboard, 4) fast acting automatic recording potentiometer (EPP-09) and 5) hand reel with electric cable 100 m long. The pressure receiver is attached to the float and by the cable to the potentiometer and submerged to the depth of the largest wave length. The pressure changes due to movements of the float are transmitted through the cable to the recording potentiometer. The wave measurements are carried out every 2 hours for 24 hours. Operation of the whole installation is critically evaluated and a few improvements are suggested. *Subject Headings:* **1. Ocean wave meters 2. Atlantic Ocean.**—*N.P.S.*

12.11–132 551.465(261)

Swallow, J. C. and Hamon, B. V. (*both, Natl. Inst. Oceanog., Wormley, Surrey*), **Some measurements of deep currents in the eastern North Atlantic.** *Deep-Sea Research*, London, 5(2):155–168, Feb. **1960.** 10 figs., table, 9 refs., 3 eqs. **DWB.** Also in: *International Oceanographic Congress, 1st, N. Y.*, 1959, *Reprints of abstracts of papers.* Issued Wash., D. C., AAAS, **1959.** p. 442–443. French summary p. 443. **DWB** (551.46082.161pr)—Deep current measurements extending over several weeks were made in a small area of the eastern North Atlantic during the summer of 1958, and a number of hydrographic stations were occupied in the same area. The work formed part of the program of a joint British-Norwegian IGY cruise. The currents were found to be variable in tiem with periods of a few weeks, and in space over a distance of a few tens of miles. In a vertical section, velocities did not decrease uniformly with depth, and no 'level of no motion' was found. *Subject Headings:* **1. Ocean current measurements 2. British-Norwegian IGY cruise 3. Eastern North Atlantic.**—*Authors' abstract.*

12.11–133 551.511.3:551.465(263):551.515

†Newton, Chester W. (*Univ. Chicago*), **Estimates of vertical motions and meridional heat exchange in Gulf Stream eddies, and a comparison with atmospheric disturbances.** *Journal of Geophysical Research*, Wash., D. C., 66(3):853–870, March **1961.** 18 figs., 2 tables, 24 refs., 7 eqs. **DLC**—On the basis of certain assumptions about the subsurface structure of the Gulf Stream eddy "Edgar" (1950), computations were made of various properties of large-scale oceanic eddies by the methods employed in the study of atmospheric disturbances. It was found that during the formation of "Edgar" the southward flux through its neck in upper levels exceeded its rate of areal expansion, the reverse being true in lower levels. This implied general subsiding motions, reaching probable maximum mean values of 30×10^{-3} cm/sec at 500-m depth. Indications are that descending motions were much stronger in the southern than in the northern part of the eddy. The heat exchange across the mean Gulf Stream, associated with the separation of one eddy from the main cold-water mass, was found to be about 200 to 400×10^{18} g-cal. A small annual number of eddies such as "Edgar" would be capable of transporting enough heat across the Stream to balance the loss of heat through the sea surface in the entire cold-water area west of Newfoundland. Horizontal and vertical mass transports in the Gulf Stream eddy, during the period of formation, were found to be comparable to those in a cold outbreak in the atmosphere. *Subject Headings:* **1. Meridional exchange 2. Oceanic eddies 3. Heat balance of Gulf Stream 4. North Atlantic.**—*Author's abstract.*

12.11–134 551.465:532.5:536.25

Stern, Melvin E. (*Woods Hole Oceanog. Inst., Mass.*), **The "salt-fountain" and thermohaline convection.** *Tellus*, Stockholm, 12(2):172–175, May **1960.** ref., 11 eqs. **DWB,**

DLC—A "gravitationally stable" stratification of salinity and temperature, such as is obser in the oceans, is actually unstable due to the fact that the molecular diffusivity of hea much greater than the diffusivity of salt. We discuss this stability characteristic and form of the convective motion in the laminar regime. Future studies of this model rela to the amplitude of the motion and the subsequent transition to turbulence should lead to formulation of critical observations questions, which will determine whether the propo mechanism is significant in the vertical mixing of the sea. *Subject Headings:* **1. Thermoha convection 2. Salt fountain in the sea 3. Vertical mixing in the sea.**—*Author's abstract.*

12.11–135 551.464:546.264:551.51

Kanwisher, John (*Woods Hole Oceanog. Inst., Mass.*), **pCO_2 in sea water and its ef on the movement of CO_2 in nature.** *Tellus*, Stockholm, 12(2):209–215, May **1960.** 5 fi 11 refs. **DWB, DLC**—A method is described for measuring pCO_2 in sea water. A gas pl is analyzed continuously by infrared absorption for CO_2 while it is equilibrated gently with water in a countercurrent column. It has been used to determine the changes in pCO_2 produ by variations of temperature and total CO_2. Partial pressure shows large changes for sm increments in these two independent variables. These properties of sea water are usefu estimating the movement of CO_2 between the atmosphere and oceans. It appears, for insta that most of the fossil fuel CO_2 released by man has been effective in increasing the percen of this gas in air. *Subject Headings:* **1. pCO_2 in sea water 2. Carbon dioxide cycle.**—*Auth abstract.*

12.11–136 551.46:681.14:62

Froese, C., **Programs for oceanographic computations and data processing on the electr digital computer ALWAC III-E, DP-3 oceanographic station data program.** *Canada. F eries Research Board, Manuscript Report Series* (Oceanographic and Limnological), No. June 17, **1960.** 23 p. forms, eqs., 2 refs. On t-p.: Programmed by the Canadian Commi on Oceanography. **DWB** (551.46 C212ma)—Describes an oceanographic data proces program, essentially a variation of DP-1, the first station data program set up. In this prog several new changes have been introduced to speed up the computations and make the sys as a whole more efficient. In the main the new program consists of these relatively indepen components: input-output-station headings, input-data interpolation, computation and ou results. *Subject Heading:* **1. Oceanographic data processing programs.**—*I.S.*

F2. HYDROLOGY

See also: **Land and life in S.W. Asia** (Cressey), 12.11–11; **Soil moisture** (Rode), 12.11–18; **Classification of rivers, U.S.S.R.** (Kuzin), 12.11–19; **Hydrographic Yearbook, 1958,** 12.11–21; **Ground water levels, New Mexico, 1956** (Reeder et al.), 12.11–23; **Primer on water** (Leopold, Langbein), 12.11–36; **Spatial and temporal distribution of oxygen in water** (Kuhlmann), 12.11–143; **Radioactive meas. of hydrological regime** (Dimaksian), 12.11–180; **Max. level of spring flood, Northern Dvina estuary** (Goroshnikov), 12.11–360; **Evapotrans. of forest stand on clayey soils with high groundwater-table** (Holstener-Jorgensen), 12.11–361.

12.11–137 551.577.37:551.311:6

Michel, A., **La forte pluviosité de l'automne 1959 à Banyuls. Conséquences sur l'éro des sols.** [The high amounts of rainfall in autumn 1959 at Banyuls. Effects on soil erosi *Revue Forestière Francaise*, Nancy, No. 4:257–266, April **1960.** 2 figs., table.—Excepti rainfall fell on the region of Banyuls (eastern Pyrenees) in September–October 1959 cau severe erosion and extensive damage to vines, source of only agricultural product of this reg A table indicates the monthly and daily rainfall amounts; comments are expressed on r flow and on the importance of erosion caused by these exceptional rains. Among the rec mended remedies for this region is the planting of a dense forest over several thousand hect *Subject Headings:* **1. Rainfall intensities 2. Rainfall effects on erosion 3. Banyuls reg France.**—*A.V.*

12.11–138 551.482.215.3:551.577.37(282.243.7–43)

Kern, Helmut, **Der Hochwasserregen im südlichen Donaugebiet vom 12. bis 14. Juni 1959.** [Flood-producing rain in the southern Danube area from June 12 to 14, 1959.] *Deutsche Gewässerkundliche Mitteilungen*, Coblenz, 4(3):57–63, June 1960. 5 figs., 2 tables, refs. **DWB**—Local weather conditions which caused heavy rains, high water levels and floods in the southern Danube Region are explained. No adequate warning service is available to enable precautionary measures to be taken. *Subject Headings:* **1. Excessive rainfall 2. High water levels 3. Floods 4. Danube region, Germany.**—*E.Z.S.*

12.11–139 551.345:551.525.5:551.579:551.491.5

Kalabin, A. I., **O vliianii podmerzlotnykh vod i naledeĭ na pitanie rek i vodnyĭ balans na Severo-Vostoke SSSR. K voprosu regulirovaniia zapasov i stoka podzemnykh i poverkhnostnykh vod.** [Influence of subpermafrost water and naleds on the recharge of rivers and the water balance of northeastern U.S.S.R.: problems of the regulation of the reserves and flow of ground and surface water.] *Vsesoiuznyĭ Gidrologicheskiĭ S"ezd, 3rd, Oct.* 1957, *Trudy*, Vol. 1:51–57, pub. **1959.** 4 eqs. **DWB** (M79 V985tr), **DLC** (GB651.V83)—A theoretical paper in which the author takes up separately the problems of: 1) subpermafrost water in the water balance; 2) the role of naleds and underground water sources in the formation and distribution of the flow by seasons and 3) the regulation of water reserves and of the flow of underground and surface waters. *Subject Headings:* **1. Subpermafrost water 2. Naleds 3. Water reserves 4. Northeastern U.S.S.R.**—*A.M.P.*

12.11–140 551.491.54:551.579.4:551.482.2(282.247)

Zakharchenko, G. M., **O sviazi podzemnykh i poverkhnostnykh vod Dneprovsko-Donetskogo basseĭna.** [Relation between ground and surface water in the Dnieper-Donets Basin.] *Vsesoiuznyĭ Gidrologicheskiĭ S"ezd, 3rd, Oct.* 1957, *Trudy*, Vol. 9:309–319, pub. **1959.** 2 figs. **DWB** (M79 V985tr), **DLC** (GB651.V83)—A detailed study of the alimentation and direction of movement of surface and ground water in the Dnieper-Donets Basin. It is shown that there is a definite hydrodynamic relationship a mobile equilibrium between the surface levels in river valleys which form together a certain single "hydrological level"—and the general piezometric level of ground water. *Subject Headings:* **1. Surface water-ground water relationships 2. Piezometric level of ground water 3. Dnieper-Donets Basin U.S.S.R.**—*A.M.P.*

12.11–141 551.590.2:551.491.54:551.455

†Duginov, V. I. and Korobeĭnikov, V. A., **Ritmicheskie kolebaniia urovnia gruntovykh vod Kamennoĭ Stepi i prichiny, vyzyvaiushchie ikh.** [Rythmic variations of the ground water level in the Kamennaia Steppe and its causes.] *Vsesoiuznyĭ Gidrologicheskiĭ S"ezd, 3rd, Oct.* 1957, *Trudy*, Vol. 9:303–309, pub. **1959.** 3 figs., 22 refs. **DWB** (M79 V985tr), **DLC** (GB651.V83)—An analysis of long period records shows that: 1) variations of solar activity result in corresponding variations (rhythmicity) of climate, and the latter cause variations of ground water level, river flow, etc.; 2) in a period of many years, the average of the ground water level, both under steppes and forest shelter belts, is subjected to variations. There is no raising or lowering of the ground water level under the influence of shelter belts. *Subject Headings:* **1. Ground water level variations 2. Climatic variations-solar activity relationships 3. Kamennaia Steppe, Voronezh Region, U.S.S.R.**—*A.M.P.*

12.11–142 551.49.018:551.491.54/5

Kuz'menko, L. V., **Izuchenie dvizheniia podzemnykh vod s pomoshch'iu modelirovaniia po metodu analogiĭ.** [Study of the movement of ground water by means of modeling according to the method of analogs.] *Vsesoiuznyĭ Gidrologicheskiĭ S"ezd, 3rd, Oct.* 1957, *Trudy*, Vol. 1:224–233, pub. **1959.** 2 figs., 15 eqs. **DWB** (M79 V985tr), **DLC** (GB651.V83)—The author discusses only those modifications of the method of analogs and the instruments based on them that have already been widely used, and whose further development are of considerable interest, namely, the methods of electrohydrodynamic (EGDA) and hydrologic analogs. Both these methods of investigation of filtration flow were developed in the U.S.S.R. and were used abroad only later. *Subject Headings:* **1. Ground water movement 2. Hydrologic analogs.** —*A.M.P.*

12.11–143 551.497:546.21:551.481.2(

†Kühlmann, Dietrich H. H. (*Leipzig*), **Zur Frage der räumlichen und zeitlichen Verteil von Sauerstoff und anderen chemischen Faktoren in kleinen Gewässern.** [On the prob of the spatial and temporal distribution of oxygen and other chemical factors in small bo of water.] *Beiträge zur Geophysik*, Leipzig, 69(5):294–319, 1960. 13 figs., 3 tables, 34 r German and English summaries p. 294–295. **DWB, DLC**—The hydrogen-ion-concentrat the hydrochloric combination, hydrogen sulphide and oxygen of a pond and a pool in the El Valley near Leipzig were examined during 1955 and 1956. The technique of analysi described instrumentation is also illustrated. The concentration of the hydrogen ion, fo to be in the slightly acid range, increased from spring to summer. The hydrogen sulp concentration is at its highest late in summer and in winter under a sheet of ice. Atmosph air, wind, rain, temperature, motion of water, conditions of ice and water basin, proces decomposition and assimilation of "green" plants influence the oxygen concentration. Ox tion processes are predominant in spring and summer, reducing processes are predomina winter. A reduction of oxygen concentration in the top layers was often accompanied b simultaneous increase in the layers below. This phenomenon is probably due to pa diminution of the oxygen dissolved in the molecules. Distribution of chemical facto presented in tables and diagrams. *Subject Headings:* **1. Oxygen distribution in p 2. Chemical analysis of pond water 3. Chemical limnology 4. Leipzig, Germany.**—*A author's abstract and O.T.*

12.11–144 551.578.48:551.579.3

Losev, K. S., **Laviny kak gidrologicheskiĭ faktor.** [Avalanches as a hydrologic fac *Meteorologiia i Gidrologiia*, Moscow, No. 5:38–39, May 1960. 4 refs. **DWB, DLC**— occurrence of avalanches in practically all the mountain regions of the U.S.S.R. has established. Hydrologically an avalanche can be regarded as a flow of water in the solid p Snow is displaced to lower localities where it accumulates and its redistribution influence snow supplies of river basins. The snow deposited on a slope after the avalanche accumu at the foot of the slope, forming a cone of snow of limited dimensions and with a high de All this substantially alters the conditions of melting and water yield of the snow. formation of snow weirs on rivers, the role of snow avalanches in river regimes in various of the U.S.S.R. etc. are discussed. *Subject Headings:* **1. Avalanche hydrology 2. Snow 3. U.S.S.R.**—*I.L.D.*

F3. ICE

See: **Study of snow and ice, Japan, 12.11–4.**

F4. GLACIOLOGY

See also: **Glaciers** (Sharp), 12.11–41; **Plastic deformation of floating ice plates** (Kerr), 12.11–52; **Ice cover of Antarctic** (Model', Nudel'man), 12.11–54; **Special problems of geography of E. Antarctica** (Markov), 12.11–55; **Scientific exped. by Acad. Sinica** (Chu), 12.11–62; **Densification of dry snow on high polar glaciers** (Bader), 12.11–353; **Oxygen-isotope ratios in Blue Glacier** (Sharp, Epstein et al.), 12.11–354.

12.11–145 551.578.46:551.43

Klimaszewski, Mieczyslaw (*Polish Acad. of Sci., Cracow*), **On the influence of pre- relief on the extension and development of glaciation and deglaciation of mountainous re** *Przegląd Geograficzny*, Warsaw, 32, Suppl.:41–49, 1960. 2 figs., 3 tables, 10 refs. D Describes the circumstances which result in the irregularities of the snow line, givi Tatra range in the Carpathians as an example. Unlike most mountains, the snow southern slopes of this range lay as high as the snow on the northern slope. The orog conditions account for this irregularity. The existence of big firn reservoirs on the so slopes of the Tatra range also explain the large dimensions of the glaciers. Evidence that morphological conditions played a large part in the glaciation of these mountains. *Headings:* **1. Glaciation in mountainous regions 2. Snow line irregularities 3. Tatra Czechoslovakia.**—*A.H.K.*

12.11–146 551.578.48(234.9)

Kisin, I. M. and Terterov, A. A. (*both, Gidrometeorologicheskaia Sluzhba Azerbaidzhanskoĭ SSR (Baku)*), **Obval lednika Murkar.** [Avalanche of the Murkar Glacier.] *Priroda*, Moscow, 12:66–67, Feb. **1961.** 2 figs. **DLC**—The avalanche of the Murkar Glacier occurred on Aug. 20, 1960 from the peak of the Bazar-Diuza (4486 m) in the eastern part of the principal Caucasus Range. The glaciation of Bazar-Diuza consists of two glaciers, Tikhitsa and Murkar, and a firn cap covering the top of the mountain from which five small pendant tongues issue. The Murkar Glacier extends in a northerly direction, occupying a cirque like expansion on the slope of Bazar-Diuza. The length of the glacier is 1440 m and its width is 300–400 m. In recent years the glacier has shown some activity which was manifested by transition from systematic retreat in the past 50–60 yrs to a slight extension of 3–4 m per year. At the same time the thickness of the firn tongues above the glacier increased. During the avalanche, blocks of ice were transported at great velocity by a large water wave. A small mountain stream suddenly was transformed into a raging current carrying blocks of ice, snow and stones. *Subject Headings:* **1. Avalanches 2. Murkar Glacier, Caucasus Mts., U.S.S.R.**—*I.L.D.*

12.11–147 551.321.5:551.324.5

Mathews, W. H. (*Div. of Geology, Univ. British Columbia*), **Vertical distribution of velocity in Salmon Glacier, B. C.** *Journal of Glaciology*, London, 3(26):448–454, Oct. **1959.** 2 figs., 9 refs. English, French and German summaries p. 448. **DWB, DLC.** Also issued in: *International Union of Geodesy and Geophysics, Assoc. of Scientific Hydrology, Toronto, Sept.* 1957, [*Transactions*], Vol. 4, pub. **1958.** p. 427–428. ref. **DWB, DLC**—The results of inclinometer surveys in May and Aug. of ice velocities at intervals of 50 ft in a 1625-ft drill hole are summarized. The surveys were made with a Parsons inclinometer (which photographs at a predetermined time), a pendulum, and a magnetic compass. The 94-day displacement in a direction 37.5°N±3°E. (Mag.) decreased very gradually from 69.5 ft at the surface to about 65 ft at a depth of 875 ft, then more rapidly with depth to 60 ft at a depth of 1000 ft, and to 50 ft at 1300 ft. The displacement at a depth of 1560 ft was about 31 ft, while the sliding of the glacier over the rock floor may have been as much as 25 ft. The shear stress-strain curve computed for 50 and 250 ft intervals throughout the depth of the drill hole compared closely with the lower curved portion of GLEN's laboratory-determined relationship. *Subject Headings:* **1. Inclinometer surveys 2. Glacier Movement 3. Salmon Glacier, British Columbia.**—*SIPRE Abstract.*

12.11–148 551.324.63 551.332.2/5(474.5)

Mikaila, V., **Lietuvos stambesniųjų limnoglacialinių baseinų neosėdos ir jų ryšiai su paskutiniuoju ledynu.** [Sediments of the larger glacilacustrine basins of Lithuania and their connections with the last glaciation.] *Lietuvos TSR Mokslų Akademija. Geologijos ir Geografijos Institutas, Mokslinai Pranešimai*, Vol. 7 (Geologija, Geografija), p. 5–17, **1958.** 1 fig., 12 refs. Russian summary p. 13, English summary p. 16. **DWB**—There are known to have been three stages of recession of the last glacier in Lithuania. At that time there were six large glacilacustrine basins dammed up. The very earliest basin was formed in southern Lithuania, in the area between the towns of Balbieriskis and Simnas. Its damming is associated with the longer stopping of the margin of the retreating glacier in the end-moraine zone of southern Lithuania. The sediments of this basin consisted mostly of varved clay up to seven meters in thickness. It has been proved by geochronological investigations that the accumulation in this glacilacustrine basin went on for 200 years. The greatest damming of melt waters of the receding glacier occurred at the time when the margin of the retreating glacier stopped in the area of the end-moraines of central Lithuania. At that time the basin of the Jura-Sesupe in the western part of the republic, the Kaunas-Kaisiadorys and Vievis-Sirvintos basins in the central part and the Dysna glacilacustrine basin in the eastern part of the republic were formed. There is a difference in the areas and the thickness of the varved sediments in these basins. The geochronological data indicate that Jura-Sesupe and Kaunas-Kaisiadorys glacilacustrine basins are somewhat over 300 years. The above-mentioned glacilacustrine basins, except the Dysna, were finally drained off by the Nemunas, Neris and Sesupe Rivers into the Baltic glacial-lake. The sediments of the Dysna glacilacustrine basin

are made up of fat varved clay 11.5 m thick, whose accumulation in the lake continued slow for 400 years. During the pause in the retreat of the receding glacier in the end-moraine b of northern Lithuania, the Linkuva-Pasvalys glacilacustrine basin was formed, which is pressed by varved clay 10 m thick. The drainage of this glacilacustrine basin took pl through the Dauguva River into the Gulf of Riga. *Subject Headings:* **1. Glacial lake sedime 2. Geochronological data 3. Glacier retreat 4. Lithuanian S.S.R.**—*Author's abstract.*

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS (551.501.08)

METHODS OF OBSERVATION (551.501)

See also: **Study on snow and ice, Japan, 1950–1958,** 12.11–4; **Searchlight beams in the atmos.** (Rozenberg), 12.11–12; **Agromet. research, Norway** (Lauscher), 12.11–88; **Atmos. reflection and long distance prop.** (Misme), 12.11–101; **Index JE of the E layer** (Minnis), 12.11–108; **World-Wide Ionos. Sounding Com. of URSI Com. for IGY,** 12.11–110; **Missile research in upper atmos.** (Roy), 12.11–165; **Wind velocity meas. by vanes** (Ikonnikova), 12.11–177; **Tropos. sounding by radar** (Kostarev), 12.11–195; **Amount of ozone during solar eclipse, April 1948** (Yamasaki), 12.11–203; **Atmos. heat balance over soils, Lake Balaton** (Kiss), 12.11–212; **Horiz. changes of albedo in problems of light scattering in atmos.** (Malkevich), 12.11–246; **Long wave radiation of atmos.** (Gaveskiĭ), 12.11–249; **Met. and statis. consideration of interdiurnal variability** (Levert), 12.11–258; **Temp. of dry and wet soil** (Pletser), 12.11–266; **Frequency spectra of vert. wind velocity** (Gurvich), 12.11–275; **Microstructure of wind in atmos. ground layer** (Obukhov), 12.11–276; **Vert. velocity in atmos.** (Shvets, Kagan), 12.11–291; **Vert. winds in typical terrain** (Thornthwaite, Superior), 12.11–292; **Upper atmos. wind meas.** (Elford, Murray), 12.11–298; **Wind in atmos. from 80 to 230 km** (Manring, Bedinger), 12.11–299; **Vert. currents in atmos.** (Arrago), 12.11–307; **Potential evapotrans. "El Encin," Spain, Aug. 1957–Dec. 1959** (Elias Castillo), 12.11–315; **Evapotrans. est. by heat budget and meas. by water balance from corn field** (Gerber, Decker), 12.11–316; **Evap. and evapotrans. computation from met. obs.** (Kohler), 12.11–317; **Reading of evap. tanks in ground** (Konstantinov, Fedorova et al.), 12.11–318; **Precip. meas. and cloud, thunderstorm obs. by radar** (Pietka), 12.11–327; **Radar precip. studies improving storm warning network** (Kotov), 12.11–330; **Dry-period probabilities, Ill.** (Changnon), 12.11–344; **Discrete truncated distr.** (Sneyers), 12.11–345.

12.11–149 551.501:551.

*Arnold, Abraham, **Theory and application of representativeness in meteorological me urements.** *U. S. Signal Research and Development Lab., Ft. Monmouth, N. J., Techn Report*, 2101, March 1, 1960. 33 p. 5 figs., 2 tables, 10 refs., 76 eqs. **DWB** (M(055) U58 —One of the criteria for designing a meteorological measurement is that it be representat that is, that it be designed to be directly applicable to a particular use. This is accompli by effecting a matching of the measurement to the user application. The influence funct which is derived from an analysis of the application, is the crux of the design criterion for measurement. Several influence functions, drawn principally from the artillery applicat are derived. These are treated together with hypothetical wind structures for a discussio the properties of the user application. Certain measurements are similarly treated. interrelation between influence function and admittance function is shown. *Subject Hea* **1. Representativeness in meteorological measurements.**—*Author's abstract.*

12.11–150 551.501:551.5

Saunders, W. E., **Night cooling at the two-inch soil level.** *Meteorological Maga* London, 89(1052):65–68, March 1960. 2 figs., 4 refs. **DWB, DLC**—Describes a techn for forecasting the night cooling curve at the 2 in. level in order to get an earlier forecast o probable effects of the arrival of cloud on existing fog or frost. Hourly observations of soil temperature were taken at Exeter. The cooling curves are discussed. Heat conduc theory is referred to and discussed. It suggests that the temperature at a depth of 2 in. at given time can be determined as a function of the known temperatures above and below

evel, provided adequate allowance is made for the nature of the soil and changes in the state of the soil. A comparison is made between the soil types of Exeter and Texas and their cooling rates compared. *Subject Headings:* **1. Fog clearance forecasting 2. Night cooling 3. Frost clearance forecasting 4. Soil temperatures 5. Exeter, Eng.**—*A.H.K.*

12.11–151 551.501.4:522.91

Gerstmann, W., **Über die Parallaxe zwischen Höhen- und Azimutbeobachtungen an den Enden einer Basis.** [On the parallax between high and azimuth observations at the terminal points of a base.] *Zeitschrift für Meteorologie*, Berlin, 14(3):75–79, March **1960.** 2 figs., 15 eqs. German and English summaries p. 75. **DWB, DLC**—The changes of parallax with varying azimuthal and elevation angles at the terminal points of a base line are derived and a practicable method for its ready determination is established. *Subject Heading:* **1. Parallax determination.**—*Author's abstract.*

12.11–152 551.501.45:551.58:681.177

Booth, R. E., **Climatological edge-punched cards.** *Meteorological Magazine*, London, 89(1061):330–332, Dec. **1960.** fig., ref. **DWB, DLC**—This article describes specially designed edge-punched cards containing monthly climatic data and notes together with synoptic notes and the predominant and persistent synoptic types occurring during a particular month. Some indication is given of their uses. *Subject Heading:* **1. Punched card applications to climatology.**—*Author's abstract.*

12.11–153 512.5:551.501.45

Gandin, L. S., **Zadacha ov optimal'noĭ interpoliatsii.** [Problem of optimum interpolation.] Leningrad. *Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 99:67–76, **1959.** ref., 37 eqs. **DWB**—The problem of optimum interpolation of the fields of meteorological elements is examined. General formulas of the optimum interpolation theory are derived. Simplest particular cases are examined. Methods of using in objective analyses of meteorological element fields are analyzed. One of the advantages of the proposed method of interpolation is the fact that the probable error of interpolation can be calculated simultaneously with the carrying out of the interpolation. *Subject Heading:* **1. Optimum interpolation theory.**—*A.M.P.*

12.11–154 551.501.45:551.524.2:519.27

Henson, W. R. (*Yale Univ.*), **A method for local temperature extrapolation.** *Journal of Meteorology*, Boston, 16(5):585–588, Oct. **1959.** 2 figs., 3 tables, 8 refs. **DWB, DLC**—In order to obtain more accurate estimates of field temp. from climatological station data in areas of broken topography, the author adopted the method of air mass climatology. The results of a preliminary investigation of air mass effects on local data for an area lying across the Great Divide of the Rocky Mountains in the central part of the Alberta-British Columbia boundary are presented. Reviews the air mass analysis and statistical analysis, which involved the use of residual variances of regressions and regression coefficients for determining whether the stations of the test area offer a wide variety of temp. relationships, whether the relationship of field temp. to home temp. was different when both stations were under the same air mass from that when they were in different air masses and whether the relationship between field temp. and home temp. was affected by air mass origin. It is shown that the extrapolation of temp. from a home station may be accomplished by the derivation of appropriate regression statistics on the bases of paired temp. data stratified by air mass type. The extrapolation is made by typing the weather at the time required and reading the Y value corresponding to the observed X forms the appropriate regression line. *Subject Headings:* **1. Air mass climatology 2. Statistical analysis 3. Local temperature extrapolation methods.**—*I.L.D.*

12.11–155 551.501.45:551.552:551.511.32

Mertsalov, A. N., **Chislo sharopilotnykh dannykh, neobkhodimoe dlia rascheta divergentsii skorosti vetra.** [The number of pilot balloon soundings necessary for the computation of the divergence of the wind speed.] *Meteorologiia i Gidrologiia*, Moscow, No. 9:49–51, Sept. **1960.** table, 3 refs. **DWB, DLC**—From probability theory a table has been computed which, given the accuracy limits of the observations, will enable an assessment to be made of

the numbers of stations required in a certain area in order that the computed divergence lie within certain limits of accuracy with varying probabilities. The results are intended to applied when computing the divergence using accepted Russian nomograms. *Subject Headings:* **1. Observational errors 2. Statistics 3. Wind speed divergence computation 4. P balloon soundings.**—*R.B.*

OBSERVATIONAL DATA (551.506)

See also: **Hydrographic Yearbook, 1958,** 12.11–21; **Met. Yearbook, Austria, 1959,** 12.11–22; **The long rescue** (Powell), 12.11–42; **Snowstorms and winds** (Shcherbakov), 12.11–53; **Scientific exped. by Acad. Sinica** (Chu), 12.11–62; **Irish weather diary, 1711–1725** (Dixon), 12.11–65; **Veg. period variations** (Conrad), 12.11–81; **URSI Com. for IGY** (Beynon), 12.11–109; **Seasonal var. in ocean levels** (Selitskaia), 12.11–127; **Representativeness in met. meas.** (Arnold), 12.11–149; **10 yrs. obs. of global radiation, Zagreb,** (Penzar), 12.11–243; **Heavy falls on rainfall days, 1876–1955** (Glasspoole), 12.11–340; **Electrostatic field in free atmos., IGY invest.** (Imianitov, Chubarina), 12.11–396.

12.11–156 551.506.1:551.582.2

*Brose, Karl, **Veröffentlichte Extenso-Beobachtungen deutscher Klimastationen.** [lished complete observations of German climatic stations.] *Germany. Deutscher We dienste, Mitteilungen*, 3(18), **1960.** 11 p. mostly tables, refs. **DWB**—Information rela to German climate within the time interval 1876–1955 is available by a perusal of the perti literature. A chart lists localities and districts and the literature available for each w specific periods. *Subject Headings:* **1. Climatic data summaries 2. Germany.**—*E.Z.S.*

12.11–157 551.506.1:551.582.2(4

*Zagreb, Sveučilište. Geofizički Institut. Opservatorij Grič, **Meteorološki izvje** [Meteorological Bulletin], 1941 and 1942, both pub. **1958.** Also 1956 and 1957, pub. and **1958.** Each about 40 p. Entirely tables. Title-page and captions in Croatian English. (For abstract on 1953 and 1954 issues, *see* 8.3–102, March 1957, *Met. Abs.*) **DW** These annual data summaries contain detailed tabulation of hourly mean pressure, t vapor pressure, relative humidity, cloudiness, wind speed for each month, total precip., nu of hours of precip. and sunshine, and monthly wind frequencies together with mean and ext values of the various elements. Thrice daily (07, 14 and 21) data are included in all appli cases except where hourly values are given. *Subject Headings:* **1. Annual climatic data maries 2. Grič Observatory, Zagreb 3. Zagreb, Yugoslavia.**—*M.R.*

12.11–158 551.506.22:551.547.5 551.51

*§Panofsky, Hans A., **Monthly mean 50 mb and 100 mb charts preceding the IGY.** I sylvania. State Univ. Mineral Industries Experiment Station, Dept. of Meteorology, Con AF 19(604)-2190, Final Report, Pt. 3 (of three parts), Aug. **1960.** 23 p. 3 tables, eq. charts included. **DWB**—This report contains mean monthly maps of the lower stratos for the 24 months, July 1955 through June 1957. 50 mb and 100 mb charts for the firs months of the IGY are also presented. Regression coefficients for vertical extrapolati 50 and 100 mb are presented in tabular form. Also tabulated are mean heights for la belts and mean temp. for latitude belts. Ozone measurements at University Park are in the appendix. The text preceding the tables and maps discusses the observations, e olation procedure and radiation correction. *Subject Headings:* **1. Mean monthly 5 charts 2. Mean monthly 100 mb charts 3. Mean monthly stratospheric maps.**—*I.S.*

12.11–159 551.506.3:551.524.37(

*Lauscher, Friedrich, **Spät- und Frühfröste am Alpenostrand (Burgenland).** [Lat early frost on the east side of the Alps (Burgenland).] *Wetter und Leben*, Vienna, 12(5/6) 133, 1960. 3 tables, 6 refs. **DLC**—Frost dates are of general interest but important for studying flora and fauna. A list of weather stations, their altitude above sea level a dates for which data are available is given. Dates of early and late frost from 1936 t at 10 stations are tabulated. *Subject Headings:* **1. Frost data 2. Burgenland, Austria.**—

12.11–160 551.506.8(46)

*†Ottmar, Dietrich, **Beiträge zur Phänologie Spaniens auf Grund der phänologischen Beobachtungen des Spanischen Wetterdienstes, 1943–1954.** [Contribution to the phenology of Spain based on phenological observations of the Spanish Meteorological Service, 1943–1954.] *Germany. Deutscher Wetterdienst, Berichte*, 9(60), **1960.** 27 p. 3 figs., 4 maps, 6 tables, 44 refs. **DWB, DLC**—In 1943 the Servicio Meteorológico Nacional established a phenological network for Spain which has been extended since then. The results of the phenological observations of more than 50 plant species are published continuously. The present paper refers to the observations from the period 1943 through 1954. Six phases (almond blossom, apple blossom, maize seed, harvest of winter corn, vintage, fall of fig leaves) have been selected from the abundant material and represented on maps. Each of these phases shows characteristic features of the seasonal changes of vegetation in Spain. A number of further phenological events could not be entered on maps due to the scarcity of observations but they are referred to in the text. Finally, the causes for the phenological differences in single regions and seasons are discussed. The relationships between the periodical modifications of the climate and the phenological phenomena are evident. *Subject Headings:* **1. Phenological observations 2. Climatic periodicities 3. Spain.**—*Author's abstract.*

INSTRUMENT CARRIERS (551.507)

See also: **Rocket obs. of solar ultraviolet spectrum** (Tousey), 12.11–79; **Geomag. meas.-third Soviet satellite** (Dolginov, Zhuzgov et al.), 12.11–80; **Sodium and lithium in high atmos.** (Blamont et al.), 12.11–197; **Winds in the atmos. from 80 to 230 km** (Manring, Bedinger), 12.11–299.

12.11–161 551.507.321.2

Slater, R. J., **Superpressure balloons.** Schjeldahl (G. T.) Co., Northfield, Minnesota, Contract Nonr-2445(00), Progress Report No. 1, Nov. 15, 1957–May 15, **1958.** 47 p. 23 figs. (incl. photos), table, 3 refs., eqs. **DWB** (M(051) S337su)—The balloon flights conducted under this study have shown that a closed cell "Mylar" balloon, carrying a 10 lb load of instruments at an altitude of 30,000 to 40,000 ft, can maintain flight through sunrise on sunset at a constant pressure-altitude without the necessity for releasing ballast. The 2 mil "Mylar" cylinder balloons (5.74 ft in diameter and 50 ft long), used in these experiments, indicated a sunset effect ranging between 2.3% and 5.8% of the system's pressure-altitude, as determined from telemetered balloon superpressure and ambient pressure data. The effects of varying long wave infrared radiation, coincident with the apparent cloud cover on the balloon superpressure (superheat), was found to be extremely noticeable. Additional studies are being conducted to further determine the effects of environmental changes on the superpressure balloon system. *Subject Headings:* **1. Superpressure balloon systems 2. Atmospheric effects on balloons 3. "Mylar" balloon.**—*Author's abstract.*

12.11–162 551.507.321:629.132.1:551.521.64:574.6

†Simons, David G., **Observations in high-altitude, sealed-cabin balloon flight.** *Air University Quarterly Review*, Wash., D. C., 10(2):65–88, **1958.** 5 figs., 18 refs. **DLC**—The biological effects of heavy cosmic ray primaries are analyzed in the first part of this paper. Emphasis is laid on the results to date of exposure of "wet" human and animal tissues, as illustrated in the graying effect on black mice and on the genetic effects on Neurospora during the 1954 experimental investigation. The second part is a review of flight experiences and observations made on the first two man-high balloon flights above 90,000 ft where diminution of heavy cosmic ray primaries occur. Astronomical observations are also discussed. *Subject Headings:* **1. High altitude balloon flights 2. Cosmic ray effects on living matter.**—*N.N.*

12.11–163 551.507.362.1

Lockheed Aircraft Corporation. Missile Systems Div., Palo Alto, Calif., **Proposal for a meteorological rocket.** Its *LMSD*-2085A, April 17, **1957.** 43 p. 9 figs. **DWB** (M07.362 .816pr)—This is a preliminary analysis of high altitude sounding methods used in the de-

velopment of a single meteorological rocket system that will satisfy the requirements of t Army, Navy, Air Force and Weather Bureau. It is intended to aid in daily weather analy and long range forecasting for military and commercial operations. The report covers t technical discussions of the concept, the system and how it operates, as well as the ent development plan and the related experience and facilities. *Subject Heading:* **1. Meteorologi rockets.**—*N.N.*

12.11–164 551.507.362.1:551.508.822:551.507.

†Poppoff, I. G.; Bell, G. B. and Yaffe, I. S., **Low-cost meteorological rocketsonde syste Phase 1, Feasibility study.** Stanford Research Institute, Menlo Park, Calif., Contr CD-GA-56-55, Final Report, April 30, **1957.** 90 p. figs., 23 refs. **DWB** (M(051) S785r A meteorological rocketsonde system is suggested that is technically and economically feasil The various technical problems are analyzed and discussed and cost estimates are presen for both the development of such a system and the mass-produced expendable unit. system would use a single-stage solid propellant rocket to carry a parachutesonde up to 150, ft., at which point it would be released. Use of the AN/GMD-2 rawinsonde system is rec mended for tracking the descending parachute and for telemetering meteorological da Although development of a rocket motor case that can be fragmented, pulverized, or burne recommended, a network of remote stations is suggested that would provide for the collect of adequate meteorological data while eliminating the possibility of public hazard. operational schematic chart of the rocketsonde system is shown. Data are given in tab Illustrations included show Beacon transponder dual-band antenna pattern; maximum ra parachutesonde path; the radiosonde and rawinsonde reporting network; and aeronaut charts for each of the 15 stations. Appendices give important descriptions of rawinso system AN/GMD-2 (17) and rocket dynamics. *Subject Headings:* **1. Meteorological roc sonde system 2. Parachutesondes.**—*E.Z.S.*

12.11–165 551.507.362.1:551.5

Roy, Maurice, **Expérimentation d'un missile pour recherches en haute atmosph** [Experimentation of a missile for research in the upper atmosphere.] *Académie des Scie Paris, Comptes Rendus*, 250(21):3431–3432, May 23, **1960.** ref. **DWB, DLC**—Account o experiment made on May 5, 1960 on Ile du Levant by the Office National d'Etudes e Recherches Aéronautiques (National Office of Aeronautical Studies and Research). purpose of this experiment was to study the aerothermodynamic conditions encountered w a moving body enters the atmosphere at a high speed. The experimental means was a 4-s rocket, the last of these stages bearing the measurement instruments and the emission modulation equipment for the wireless transmission of signals representing the measureme In the course of the experiment the first, second and third stages were successively ign The third stage after it became inactive remained an integral part of the fourth, and a reaching an 150 km altitude, it was separated in the descent at 45 km altitude. Then fourth stage was ignited and reached a speed of 8,000 km/h at 25 km altitude, central p for the study of entering the atmosphere. All the measurement, transmission and meas ment-collecting instruments have worked without any failure. This experiment has sh that this French missile is quite appropriate for spatial scientific research beyond the i sphere. *Subject Headings:* **1. Rocket research 2. Rocket exploration of upper atmosp 3. Rocket instrumentation 4. Ile du Levant, Mediterranean.**—*A.V.*

12.11–166 551.

†Klinov, F. Ia., **Issledovaniia v prizemnom sloe atmosfery na bashniakh i macht** [Study on the surface atmospheric layer on towers and masts.] *Meteorologiia i Gidrolo* Moscow, No. 12:37–42, Dec. **1960.** table, 39 refs. **DWB, DLC**—This paper is a revie recent work using instruments mounted on towers or masts. The studies undertaken by means can be divided into three types: 1) *gradient investigations* in which measurement made of the diurnal variations and the profiles of various meteorological elements, 2) *stru investigations* in which measurements are made of the turbulent and vortex structure o atmosphere and 3) *physical investigations* where relationships are sought between the varia

of various physical (nonmeteorological) and meteorological parameters. The author sets out some of the conclusions which can be drawn from already published work and in conclusion lists the various problems which can be studied using masts and towers. *Subject Headings:* **1. Tower observation 2. Surface layer of air.**—*R.B.*

INSTRUMENTS (551.508)

See also: **Searchlight beams in the atmos.** (Rozenberg), 12.11–12; **Altimeter error meas.** (Gracey et al.), 12.11–77; **Low-cost met. rocketsonde system** (Poppoff), 12.11–164; **Conversion of spherical radiation to global radiation** (Schüepp), 12.11–244.

12.11–167 551.508.21/5:551.521.9

Fritschen, Leo J. (*Iowa State Univ.*), **Construction and calibration details of the thermal-transducer-type net radiometer.** *American Meteorological Society, Bulletin*, 41(4):180–183, April 1960. 4 figs., 11 refs. **DWB**—The details of construction and method of calibration of the miniature net radiometer, model III, are described. This miniature net radiometer is not sensitive to ambient temperature and can be used in conjunction with any sensitive potentiometer. However, a recording potentiometer is preferred. Twenty-four miniature net radiometers are currently being used in a field experiment to determine the evapotranspiration energy of corn at Iowa State University. *Subject Headings:* **1. Radiometers 2. Radiation measurement devices.**—*Author's abstract.*

12.11–168 551.508.25:551.521:535.23

Brounshteĭn, A. M., **Chernyĭ izluchatel' s bol'shim otverstiem.** [Black radiator with a large aperture.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 100:93–104, 1960. 6 figs., 3 tables, 12 refs., 5 eqs. Russian summary p. 93. **DWB**—In a number of cases a black radiator of moderate dimensions, with a large working aperture and of high radiation power is needed. Such radiators, among other uses, are needed for the investigation of black-body radiation spreading in the atmosphere. The brief investigation and discussion of the theory of black cavity is given. The method of increasing the radiation power of the cavity without enlargement of it is described. The system of rational heating is discussed. The experimental model of the radiator is described. The mathematical analysis indicates the best practical form of the cavity. The method to increase the actual radiation of the cylindrical cavity is described; its mathematical bases are given. The article concludes with detailed description of the apparatus, explanatory drawings and the picture of the assembled radiator. *Subject Headings:* **1. Black radiators 2. Black-body radiation investigations.**—*B.J.G.*

12.11–169 551.508.25

Funk, J. P. (*C. S. I. R. O. Div. of Meteorological Physics, Australia*), **Improved polythene-shielded net radiometer.** *Journal of Scientific Instruments*, London, 36(6):267–270, June 1959. 3 figs., table, 10 refs., 4 eqs. **DLC**—An improved net radiometer using very thin hemispherical polythene windshields is described. Balanced radiant heating of the windshield prevents formation of dew. Two of these instruments, suitably matched, permit direct measurements of radiative flux divergence in the lowest few meters of the atmosphere, with an accuracy of at least 10%. Some preliminary results are given. *Subject Headings:* **1. Net radiometers 2. Radiation flux measurement.**—*Author's abstract.*

12.11–170 551.508.25:536.24

*Podol'skaia, E. L., **O raschete teplootdachi balansomera, I.** [Calculation of the heat emission of the balance meter, Pt. 1.] *Leningrad. Universitet, Vestnik*, No. 22:39–55, 1959. 7 tables, 16 refs., 48 eqs. English summary p. 54. (No. 4 of subseries, *Ser. Fiziki i Khimii.*) **DLC** (AS262.L463), **DWB** (M11.33 P742or)—The problem of the balance meter heat exchange in the field is discussed, the laminar boundary layer on its plate being unsteady due to turbulent pulsations of wind. An approximate solution of the velocity boundary layer equations is

obtained by two successive approximations. The formulas for stationary and nonstationa shearing stress at the wall are compared. The quasistationary approximation is found va for the average wind velocity greater than one meter per second. *Subject Headings:* **1. Rad tion balance meter 2. Heat emission of balance meters.**—*E.Z.S.*

12.11–171 551.508.25:536

*Pokrovskaia, I. A., **Pogreshnosti poverki termoelektricheskikh balansomerov.** [Verifi tion errors of thermoelectric radiation balance meters,] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 101:64–73, **1959.** fig., 14 tables, 5 refs. **DWB**—This investigat of verification errors of the 10-battery thermoelectric balance meter manufactured by Experimental Workshop of the Main Geophysical Observatory aimed at estimating the err with which the parameters of the balance meters are determined during verification. errors estimated include random errors of the conversion multiplier and of the sensitivity of balance meter and of wind corrected multipliers. The study includes also an examination the dependence of the sensitivity of the balance meter upon intensity and direction of radia incidence, upon environmental temperature and upon direction of enveloping air curre The conversion multipliers of the balance meter obtained as a result of repeated verifica under laboratory and natural conditions are in good agreement. The mean square error of conversion multiplier is 1.2% when tested under laboratory conditions and 1.6% under nat conditions with the use of a mounting and 3.5% under natural conditions without a mount Within the limits of radiation balance encountered under natural conditions, the sensitivity balance meter does not depend upon the magnitude of the measured radiation balance. sensitivity of the balance meter depends upon the direction of radiation incidence: with increase in the angle of incidence the sensitivity of the instrument diminishes. Accordi the values of radiation balance measured by the balance meter are always reduced. In case of measurements by an unshaded balance meter, correction multipliers, which are diffe for each instrument, must be introduced. The mean square error during the determina of wind correction multipliers in a wind tunnel is equal to 1.3% when the velocity of th current is 5 m/sec and 1.7% when it is 10 and 15 m/sec. The recordings of a balance m during wind depend substantially upon the air currents streaming about the instrun Accordingly the correction multipliers obtained in the wind tunnel must be used only to co mean balance meter values. *Subject Headings:* **1. Thermoelectric balance meters 2. strument errors 3. Radiation balance meters.**—*I.L.D.*

12.11–172 551.508.25:535.245:6

Roussel, L., **Méthodes britanniques récentes pour mesurer la lumière en forêt.** [R British methods for measuring the light in forests.] *Revue Forestière Française*, N No. 3:198–200, March **1960.** 6 refs. **DA**—Analysis of various methods and instrum used for the study of light distribution in forests. G. C. Evans' brightness meter, P. S. ton's instrument which utilizes a photoelectric cell with 3 sensitivities, G. S. Brown's p graphic method and R. D. Connor and W. A. Fairbairn's photochemical method are cessively reviewed. This last method is simple, inexpensive and very convenient. A p electric cell, permanently placed in the underwood, is connected with a voltmeter cons of two silver plates plunged in a silver nitrate solution. The weight of the two electro accurately controlled at the beginning of the experiment. Under the action of the electric current produced by the cell, a transfer of 0.001118 grams of silver is operated to the cathode. Weighing carefully the two electrodes at the end of the experiment suppli accurate indication of the quantity of light received by the cell. The results obtained th the various methods are in good agreement. At the surface an average radiation of 7 c is observed for a mean day which is approximately 2% of that of the complete open air. intermediate level (11 to 14 m above soil level) is mainly responsible for the strong redu of light observed. At noon, for example, for a light equal to 100 at the top of the high only 50 is recorded in the intermediate level, and only 1 to 2 on the forest soil. *Subject ings:* **1. Forest radiation 2. Light intensity measurement in forests 3. Photoelectric** —*A.V.*

12.11–173 551.508.26:551.524.4

Pakhomov, L. A., **Vliianie inertsii datchikov temperatury aerologicheskikh priborov na rezul'taty issledovaniia inversionnykh sloev.** [Influence of the inertia of temperature measuring in aerological instruments upon results of investigations of inversion layers.] *Moscow, Tsentral'naia Aerologicheskaia Observatoriia, Trudy*, No. 31:74–78, **1959.** fig., 2 refs., 10 eqs. **DLC**—The coefficient of inertia of the measuring instruments has an important role in the determination of any physical property. The author made an attempt to evaluate this coefficient in the study of a thin inversion layer of atmosphere during ascending (or descending) of the aerological instruments. In other words, the temperature "lag" between observed and actual temperatures must be determined with the consideration of the inertia of the temperature measuring elements and also the effective changes in temperature gradient, occurred in the inversion layer during movements of the instruments. The temperature "lag" is mathematically formulated with the coefficient of inertia characteristics of the temperature measuring elements, temperature gradient distribution and other factors. The equation is solved for different values of gradient and geometric characteristics of the inversion layer within limits of upper and lower boundaries. The analysis of the results lead to conclusion that the aerological instruments can distort considerably the vertical distribution of temperature unless the "effective" inertia of the instrument is considered as it was discussed in the text. *Subject Headings:* **1. Temperature measuring instruments 2. Inertia coefficient of instruments 3. Inversion layer measurement.**—*N.P.S.*

12.11–174 551.508.26

Yajima, Y., **Response of thermometer: a note on the measurements of temperature.** *Journal of Meteorological Research*, Tokyo, 12(9):602–609, Sept. **1960.** 2 figs., 6 tables, 39 eqs. In Japanese; English summary p. 602. **DWB, DLC**—In the measurement of temperature, the time lag of thermometer is very important. The equation of heat transfer between the thermometer of temperature θ and the surrounding medium of temperature θ_e is given by: $\frac{d\theta}{dt} = -\frac{1}{\alpha}(\theta - \theta_e)$ where t denotes the time and α the time lag coefficient of thermometer. The author discussed the equation for various cases of surrounding temperature, and then calculated the observed mean temperature θ, the true mean temperature θ, the error of observed temperature $\Delta\theta$ and the error of observed mean temperature $\Delta\theta$. *Subject Headings:* **1. Temperature measurement 2. Thermometer lag.**—*Author's abstract.*

12.11–175 551.508.29:621.317

Dauphinee, T. M. and Preston-Thomas, H. (*Div. of Appl. Physics, Natl. Res. Council, Ottawa*), **Direct reading resistance thermometer bridge, Pt. I.** *Review of Scientific Instruments*, N. Y., 31(3):253–257, March **1960.** 3 figs., 25 eqs. **DWB, DLC.** Also: Dauphinee, T. M.; Kriby, C. G. M. and Preston-Thomas, H. (*all, Div. of Appl. Physics, Natl. Res. Council, Ottawa, Canada*), **Pt. 2,** *Ibid.*, 31(3):258–263, March **1960.** 5 figs., eqs. **DWB, DLC**—The paper describes the basic circuitry required for a high precision direct reading resistance thermometer with dials calibrated in degrees C and any standard platinum resistance thermometer as sensing element. A circuit has been developed which, through linear variations of the resistance elements, gives a quadratic law having the form $R = R_0(1 + AT + BT^2)$ where B is negative, as is required for a platinum thermometer. At the same time it allows separate adjustments for slope A and curvature B or B/A of the resistance vs. temperature relation of the particular thermometer being used and also for the ice point resistance R_0. The auxiliary circuitry is given for comparing the computing circuit with the thermometer and for maintaining a constant recorder sensitivity of all temperatures; stability requirements for work to 0.001°C over a 700°C range are discussed. This paper presents the details of circuitry and construction for a direct reading resistance thermometer which has been built utilizing the design criteria formulated in Pt. I. By using any standard 25.5 Ω platinum resistance thermometer as a sensing element, the bridge gives subdivision of the temperature scale to 0.001°C between −50° and 700°C with an accuracy exclusive of that of the thermometer of about ±0.001°C. Methods are described and allow for variations of thermometer constants, for

autocalibration of the bridge circuit, and maintaining constant sensitivity by variation of th thermometer current. The bridge as described has performed satisfactorily for three yea and has proved to be a useful and convenient laboratory tool. *Subject Headings:* **1. The mometer bridges 2. Resistance thermometers.**—*Authors' abstract.*

12.11–176 551.508.4:53.0

Blumenauer, Robert E. L. and Harrison, L. P., **Program for the national standardizati of pressure-measuring and -actuated equipment.** Paper to be presented at a Symposium Barometry, especially as Related to Calibration of Altimeters, held by the Air Transpo Association of America, Sept. 27–29, 1960, Wash., D. C. Wash., D. C., U. S. Weather Bureau Sept. 1960. 21 p. eqs. **DWB** (M08.4 U587pr)—The aim of this report is to encourage ado tion of standardized pressure-measuring and actuated equipment. Sometime when pressur measuring equipment is transported from one laboratory to another, it departs from its origin calibration over a period of time. The term 'residual error' is used to indicate the differen between observed indication of the device and the time value obtained from the readings of standard barometer. The negative of the 'residual error' is termed 'residual correctio This paper considers means of determining the 'residual correction' for various classes barometers, altimeter-setting indicators, altimeters. Various equations regarding correcti of residual errors are discussed. The development and use of a mobile primary barome for the direct calibration of field barometers is recommended. Also recommends the applic tion of a quality control system for aneroid instruments. It would contribute to the improv ment of the accuracy of the pressure data derived from these devices. *Subject Headin* **1. Equipment standardization 2. Altimeter calibration 3. Pressure measuring equipme** —*A.H.K.*

12.11–177 551.501.75:551.508.51:551.

Ikonnikova, L. N., **K voprosu ob izmerenii skorosti vetra fliugerom.** [The problem wind velocity measurement by means of vanes.] *Meteorologiia i Gidrologiia*, Moscow, N 4:48–50, April **1960.** fig., ref. **DWB, DLC**—A comparison of about 200 simultaneo measurements of wind velocity by means of a vane and an electrical contact anemomet which gives very accurate readings, showed that the former yields, as a rule, higher valu especially in the case of high wind speeds. A graph showing the relationship of wind veloc measured with a vane and the mean wind velocity for 10 min. measured with an electri contact anemometer and computed with a pressure map is presented. With increasing veloc the registration by means of the vane gave higher values not merely as a result of inaccurac but more as the result of characteristics of the observations made. The observers are physica unable to calculate from the vane observations continuous variations of wind velocity 2 min. They indicate as a rule, only the briefest strongest winds. The observer with vane does not observe wind velocity for 2 min. but something nearer to the average value o gust. *Subject Headings:* **1. Wind velocity measurement techniques 2. Wind vanes.**—*I.L.*

12.11–178 551.508.54:533.6

Kanō, K., **On the wind tunnel tests of 4-cup anemometers.** *Journal of Meteorolog Research*, Tokyo, 12(8):530–534, Aug. **1960.** 6 figs., 4 refs., 7 eqs. In Japanese; Engl summary p. 530. **DWB, DLC**—Results of wind tunnel tests of 71 4-cup anemometers of same type which has been adopted for years by the Japan Meteorological Agency are repor for the cases with and without the turbulence producing screen. Investigations for the eff of turbulence of wind tunnel stream on the rotation of a cup anemometer are also presenti Possible mechanism of the effect is discussed. *Subject Headings:* **1. Wind tunnel tests 2. A mometers 3. Turbulence effects on anemometers.**—*Author's abstract.*

12.11–179 551.508.54:537.

McGregor, R. R. (*Div. of Met. Physics, C. S. I. R. O., Australia*), **Transistor cup a mometer.** *Journal of Scientific Instruments*, London, 37(6):189–190, June **1960.** fig., 3 r **DWB**—A remote indicating cup anemometer is described in which transistor electronics ha been applied to obtain a compact instrument, operating off small dry batteries and capable

egistering wind speeds down to 0.2 m/s. *Subject Headings:* **1. Anemometers 2. Transistor up anemometers.**—*Author's abstract.*

12.11–180 551.482.212.3:551.508.7:551.579.5

Dimaksian, A. M., **O radioaktivnom metode izmereniia nekotorykh ĕlementov gidrologicheskogo rezhima.** [On the radioactive methods of measurement of some elements of the hydrological regime.] *Meteorologiia i Gidrologiia*, Moscow, No. 12:32–36, Dec. **1960.** 2 figs., table, 19 eqs. **DWB, DLC**—The author discusses the possibility of measuring the amount of sediment in rivers, the humidity of the soil and evaporation from the soil by measuring the absorption of gamma rays in the medium being studied. The amount of river sediment can be obtained from a knowledge of the amount of sediment per unit area of water and the rate of flow of the water. To measure the volume of sediment the author suggests the use of a gamma ray source and a detector at a fixed distance apart placed in the water. The theory of the method is detailed. Similar apparatus can be used to measure the water content of soils from which it is also possible to derive the evaporation from the soil. The underlying theory of these methods is also discussed. *Subject Headings:* **1. River sediment measurement 2. Soil moisture measurement 3. Evaporation from soil measurement 4. Radioactive measuring devices.**—*R.B.*

12.11–181 551.508.71:53.089

Höhne, W. and Sonntag, D., **Zur Theorie des Aspirationspsychrometers und seiner Eichung im Feuchteprüfschrank.** [Theory of the aspiration psychrometers and their calibration in a humidity test chamber.] *Zeitschrift für Meteorologie*, Berlin, 14(5/6):141–143, May/June **1960.** table, 3 refs. German and English summaries. **DWB, DLC**—Evidence is given that in the humidity testing device constructed by J. Schiess there is a discrepancy between the absolute humidities as measured above the water surface of the saturator and in the test chamber. Hence, the humidity values found by Schiess from his testing device data are not correct. As a consequence, there is no need for an amendment of the psychrometric formula. *Subject Headings:* **1. Aspiration psychrometers 2. Psychrometer calibration.**—*Authors' abstract.*

12.11–182 551.508.71:551.571.4:551.524.4

Konstantinov, A. R. and Golubev, V. S., **O vozmozhnosti proizvodstva gradientnykh izmereniĭ temperatury i vlazhnosti vozdukha s pomoshch'iu stantsionnykh psikhrometrov v budkakh.** [Possibility of measuring air temperature and humidity gradients by station psychrometers in a shelter.] *Leningrad. Gosudarstvennyĭ Gidrologicheskiĭ Institut, Trudy*, No. 76:152–167, **1960.** 5 figs., 3 tables, 5 refs. **DWB**—In order to determine the accuracy of gradient measurements carried out by means of station psychrometers in instrument shelters, the authors conducted a series of comparative measurements of atmospheric temp. and humidity gradients measured with aspiration and station psychrometers. The investigations were carried out in a zone of surplus moisture (Valdai) and in one of deficient moisture (Dubovka). The aspiration psychrometers were set up on a special stand at 0.5 m and 2.0 m and the station psychrometers were installed in the standard instrument shelter so that the thermometers were at a 0.5 and 2.0 m level. Tables giving the decadal air temperatures measured with the aspirating and station psychrometers and the characteristics of random errors of atmospheric temperature and humidity measurements and of their gradients measured with aspirating and standard psychrometers and graphs showing the relationship of temperature and humidity gradients as measured with aspirating and station thermometers, dependence of gradient differences upon wind velocity, air temperature and humidity stratification of the atmosphere, etc. are presented. Statistical analysis of the observations with the aid of correlation coefficients indicated the following: atmospheric temperature and humidity values and their vertical gradients measured with aspirating and station psychrometers do not have systematic errors; the random errors possess a similar order of magnitude. Accordingly in measuring gradients of atmospheric temperature and humidity, station psychrometers in instrument shelters at the same levels as aspirating psychrometers can be used. *Subject Headings:* **1. Psychrometers 2. Temperature and humidity measuring devices.**—*I.L.D.*

SYNOPTIC ANALYSIS AND FORECASTING (551.509)

See also: **Weather forecasting, 10-day period** (Egorova), 12.11–20; **Thunderstorm processes, Transcaucasia** (Guniia), 12.11–27; **Weather signs everywhere** (Dazur), 12.11–43; **New China's met. science** (Chao), 12.11–63; **Objective forecasting** (Kaufmann), 12.11–78; **Air pollution disaster-prevention program, Los Angeles Co.** (Chass et al.), 12.11–189; **Numerical calculations of Laplacian and Jacobian . . .** (Miyakoda), 12.11–205; **Variation of monthly mean surface air temp.** (Nakada), 12.11–253; **Radar precip. studies improving storm warning network** (Kotov), 12.11–330.

12.11–183 551.509.31:551.511:551.5

Kibel', I. A. and Sadokov, V. P., **O kratkosrochnom prognoze pogody v neadiabaticheski sluchaiakh.** [Short range weather forecasting in nonadiabatic cases.] *Akademiia Na SSSR. Mezhduvedomstvennyĭ Komitet po Provedeniiu MGO, Sbornik Stateĭ II Razdel P grammy MGG* (*Meteorologiia*), No. 1:7–12, **1960.** 25 eqs. **DWB** (M(055) N418ne)—T authors examine several characteristic problems of short range forecasting by methods hydrodynamics in the planetary boundary layer for the nonadiabatic case. It is assumed t for ϵ the influx of heat in unit time into unit volume can be taken as the influx of heat fr turbulent heat conductivity; the horizontal extension of this phenomenon considerably exce the vertical one so that it is possible to consider only a single vertical mixing and to w $\epsilon \frac{\partial}{\partial z}\left(\lambda' \frac{\partial T}{\partial z}\right)$ where z = height; λ' = coefficient of turbulent heat conductivity. Proceeding fr the simplest model used in forecasting, a quasistationary and quasigeostrophic model, which the terms with vertical velocity in a horizontal direction have been neglected, authors derive the equations for determining Φ (geopotential), T (temperature) and ∂T (flow of heat in the atmosphere) and presents their solution. Also the solution of the equa by means of a "BESM" electronic computer is outlined. *Subject Headings:* **1. Short ra forecasting 2. Forecasting techniques 3. Nonadiabatic heating.**—*I.L.D.*

12.11–184 551.509.313:551.50

Iudin, M. I., **O razvitii chislennogo kratkosrochnogo prognoza na osnove fiziki.** [velopment of numerical shortrange forecasting on a physical basis.] *Akademiia Nauk SS Mezhduvedomstvennyĭ Komitet po Provedeniiu MGO, Sbornik Stateĭ II Razdel Progra MGG* (*Meteorologiia*), No. 1:24–26, **1960.** eq. **DWB** (M(055) N418ne)—The au discusses the problem of evaluating various means of forecasting used in numerical forec and the possibilities of establishing the superiority of some methods of forecasting over ot In the most developed and most widely employed method of forecasting geopotential at mean level, the problem of the region of influence of vorticity advection upon variations o geopotential has not yet been solved. The widely used Poisson equation is replaced by Helmholtz equation of continuity, namely $\Delta\varphi - \alpha^2\varphi = l\tau A_\Omega$ (where φ = variation of the potential in time τ, l = Coriolis parameter, A_Ω = absolute vorticity advection; characte value $\alpha_1 = 3\times10^{-7} - 5\times10^{-7}$ 1/M. The region of influence is reduced sharply if a small co tion is introduced for the factor $\alpha^2\varphi$. The solution of both equations is practically equiv if the mutual extinction of inputs of the region of positive and negative vorticity advecti considered. The solution of the Helmholtz equation may prove to be more accurate bounded, though often large area of the earth with given artificial boundary conditions. limitation of the region of influence by use of some empirical conditions at the tropo leading to an increase in α^2 also gives good results. In the use of the baroclinic mod numerous variations of the model in which the vertical distribution of one of the equally unknowns is determined in a particular manner is not regarded as fruitful. The excl of this unknown from the system of vorticity equation and of heat advection describes accurately the relationship sought. In numerical calculations of three dimension m it is necessary to clarify the value of the steps providing the intermediate results of calcul In the analysis of orographic effects of large mountain massifs it is suggested that als presence of waves with lengths of the order of the width of the massif should be considere the theory should take into account the manner in which pressure is reduced to sea The need for further investigation of the influence function in the discontinuity layers

atmosphere (fronts, tropopause) in the study of heat flux in the atmosphere is stressed. *Subject Headings:* **1. Numerical short range forecasting 2. Forecast evaluation 3. Helmholtz equation of continuity** —*I.L.D.*

12.11–185 551.509.313:518.12:517.9

Buleev, N. I. and Marchuk, G. I., **O chislennom reshenii uravnenii dinamiki atmosfery.** [Numerical solution of equations of atmospheric dynamics.] *Akademiia Nauk SSSR. Mezhduvedomstvennyĭ Komitet po Provedeniiu MGO, Sbornik Stateĭ II Razdel Programmy MGG (Meteorologiia)*, No. 1:13–23, **1960.** 4 refs., 60 eqs. **DWB** (M(055) N418ne)—The authors present a method for numerical solution of the initial system of equations for z, T and ω based on factoring of difference equations. The system of finite difference equations is solved by means of the relaxation method which is a combination of factoring with subsequent approximation. In forecasting the fields of pressure, temperature and of vertical currents for the mean level of the atmosphere the equations used are of the form

$$\frac{\partial z}{\partial t} - k_1 \Delta \frac{\partial z}{\partial t} = k_2(z_1 \Delta z) + k_3(T, \Delta T) + k_4 \frac{\partial z}{\partial x}$$

$$\frac{\partial T}{\partial z} - a_1 \Delta \frac{\partial T}{\partial t} = a_2(T,z) + a_3[(T,\Delta z) + (z,\Delta T)]$$

$$\tau - M_1 \Delta T = M_2 \Delta(T,z) + M_3[(T,\Delta z) + (z,\Delta T)]$$

where $\pi - dp/dt$, k_1, a_1, m_1 = coefficients. The mathematical transformation of these equations is shown to be reduced to the solution of finite difference equations of the form

$$-a_{ik}\varphi_{i-1,k} - c_{ik}\varphi_{i+1,k} - b_{ik}\varphi_{i,k-1} - d_{ik}\varphi_{i,k+1} + p_{ik}\varphi_{ik} = f_{ik}$$

where $f_{ik} = F^{\circ}_{ik}\delta t$ (the index o designates values relating to the moment of time t_0) since the coefficients, being positive, satisfy the equations

$$a_{ik} + b_{ik} + c_{ik} + d_{ik} \leqslant p_{ik}$$

and

$$a_{ik} = C_{m,k} = b_{ik} = d_{im} = 0.$$

The procedure for solving the finite difference equation is presented and the derivation of equations and their solutions for forecasting the z and T fields for different levels of the atmosphere are carried out. *Subject Headings:* **1. Numerical forecasting 2. Relaxation methods 3. Difference equations 4. Forecasting techniques.**—*I.L.D.*

12.11–186 551.509.612:551.524.37 551.582.2/3:551.524.37(942)

Mason, Brian (*Climatologist, Adelaide Div. Office, Bureau of Met.*), **An example of climatic control of land utilization.** *UNESCO, Arid Zone Research*, 11:188–194, pub. **1958.** 2 figs., table. French summary p. 194. **DWB** (M84 US8cl)—An account of the frost liability survey made in the Loxton Area by the Horticultural Branch of the South Australian Dept. of Agriculture. After describing the Loxton Area and giving its climatic characteristics, the experimental details, instruments and methods of work are explained; results of the field work are discussed and the data expressed graphically. Test results are tabulated and given in the appendix. A map (in color) of the transit lines and station positions shows the frost pattern of the Loxton Area. *Subject Headings:* **1. Climatic data, Loxton, Australia 2. Frost liability studies 3. Frost survey methods 4. Loxton, Australia.**—*E.Z.S.*

ATMOSPHERIC STRUCTURE AND PHYSICS (551.510)

ATMOSPHERIC COMPOSITION (551.510.41)

See also: **pCO_2 in sea water . . . effect on movement of CO_2 in nature** (Kanwisher), 12.11–135.

12.11–187 551.510.41 551.577.13 551.510.721

Lauscher, F., **Probleme der Chemie der Luft, des Bodens und der Pflanzen.** [Problems of the chemistry of air, soil and plants.] *Wetter und Leben*, Vienna, 12(1/2):23–25, **1960.**

2 tables. **DLC**—The author discusses several articles on the chemical constitution of t atmosphere which appeared in the **Festschrift** of the State Agriculture Experiment and R search Institute, Augustenberg (1859–1959), edited by the director, HANS RIEHM. The papers are **Die Bestimmung der Pflanznährstoffe im Regenwasser und in der Luft und iH Bedeutung für die Landwirtschaft** [Determination of plant nutrient substances in rainwa and in the atmosphere and their significance in agriculture] by H. Riehm and E. Quellma and **Radioaktivatätsbestimmungen in Pflanzen und Böden aus der Umgebung der Reakto station Karlsruhe** [Radioactivity determination in plants and soils from the vicinity of t Karlsruhe reactor station] by H. Riehm and W. Scholl. Tables showing the average nutrie content of the atmosphere and of rain in Germany and Austria (g/1 million cc for air and g/ for rain) and nutrients obtained from the atmosphere and rain and nutrient removal throu plant crops (for Germany, Austria and Sweden) are presented. The figures indicate that t atmosphere and precipitation provide considerable quantities of nutrients but do not ren artificial fertilizing dispensable. As to radioactivity, the total activity (fall out activity) a K^{40} activity in the case of plants, and the earth alkali activity and Sr^{90} activity in the case soil showed an increase up to the spring of 1958. At this time the fallout activity was 1 the K^{40} activity was 19 micro-microcurie per gm of dry plant matter; the earth alkali activ was 23 and the Sr^{90} activity was 22 microcurie/km² soil surface. The Sr^{90} activity was m than ten times that for 1959 in Japan, England and U. S. although no nuclear explosions ha taken place since 1958. *Subject Headings:* **1. Atmospheric chemistry 2. Soil chemis 3. Chemical composition of rainwater 4. Radioactive fallout 5. Germany 6. Austr** —*I.L.D.*

12.11–188 551.510.41:546.17:546

Stewart, F. S. (*Industrial Chemical Engineer*), **Nitrogen oxide content of air: a contributi to data on non-constant contents of air.** Los Angeles, Calif. (1959?). unpaged. Min Contents: **Introduction.** Section 1, **NO_2 data.** Sec. 2, **NO data.** Sec. 3, **Technical deta of nitrogen oxide measurement.**—Describes the nitrogen oxide content of the air in vari parts of the world. Nitrogen oxides constitute an ingredient concentrated in the warm layer of an inversion. Most of the samples were taken at ground levels. A few were taken ships at sea. The results of some of the measurements are given in graphs. *Subject Head* **1. Nitrogen oxide in air.**—*A.H.K.*

ATMOSPHERIC POLLUTION (551.510.42)

See also: **Symposium on air pollution control, 12.11–3; Bioclimat. and biomet. aspects of allergic diseases** (Alemany-Vall), **12.11–96.**

12.11–189 551.509.9:551.510

Chass, Robert L.; Pratch, Michael et al., **The air pollution disaster-prevention prog of Los Angeles County.** *Air Pollution Control Association Proceedings*, Vol. 50, 1957. Iss **1958?** Paper No. 57 (13 p.). 19 figs., 3 tables, 9 refs. **DWB** (M10.42 A298ap). Also *Air Pollution Control Association, Journal*, 8(1):72–86, May **1958.** 19 figs., 3 tables, 9 r **DWB, DLC**—Describes the air pollution disaster-prevention program of Los Angeles Cou including the short-comings of such a program, its historical phases, its objectives and a rés of the regulation enacted into law on June 21, 1955, as Regulation VII of the Air Pollu Control Districts Rules and Regulations, as well as a description of the monitoring prog which is the key element in any effective community program for disaster prevention. *Su Headings:* **1. Atmospheric pollution disaster prevention program 2. Los Angeles, C I. Atkisson, Arthur A.**

12.11–190 551.510.42:66

Dubrovskaia, F. I. (*Inst. of Hygiene, Moscow*), **K voprosu izucheniia zagriazneniia mosfernogo vozdukha vybrosami proizvodstva sinteticheskikh zhirnykh kislot i spirtov.** study of atmospheric air pollution with discharges from synthetic fatty acids and alc producing industries.] *Gigiena i Sanitariia*, Moscow, 26(1):7–10, Jan. **1961.** 4 tables, 3

English summary p. 10. **DLC**—An inquiry has been made to determine zonal distribution of atmospheric air pollution with discharges from synthetic fatty acids and alcohol producing industries. The results obtained indicate that there is a systematic pollution of the atmospheric air with a complex of plant discharges containing fatty acids, carbohydrates, aldehydes, ketones, etc. Questioning of local inhabitants residing within a radius of 3 km has revealed that the pollution of the atmosphere with the plant discharges has an unfavorable effect on the environmental conditions. *Subject Headings:* **1. Atmospheric pollution 2. Industrial atmospheric pollution.**—*Author's abstract.*

12.11–191 551.551.8:533.15 551.510.42:697.8

†Kao, S.-K. (*Univ. Calif.*), **The effects of thermal stratification on turbulent diffusion from a continuous fixed source.** *Tellus*, Stockholm, 12(4):359–363, Nov. **1960.** fig., table, 22 refs., 22 eqs. **DLC**—The similarity principle is employed to determine the maximum velocity of the vertical propagation of a diffusing smoke flowing from a continuous fixed source in a stratified fluid. With the use of the velocity profile (Kao, **1959**) for a stratified fluid the profile of the boundaries of the smoke plume is evaluated numerically for various values of the stability parameter $s_0 = kgZ_0Q(c_peT)^{-1}u^*u^{-3}$. It is shown that the spreading of a smoke plume generally increases with increasing heat flux from the boundary surface. *Subject Headings:* **1. Smoke plume behavior 2. Turbulent diffusion from a point source.**—*Author's Abstract.*

12.11–192 551.510.42:581.33

Lakhanpal, R. N. and Nair, P. K. K. (*both, Birbal Sahni Inst. of Paleobotany, Lucknow*), **Atmospheric pollen survey at Almora.** *Journal of Scientific and Industrial Research*, New Delhi, Sec. C, 19:51–53, Feb. **1960.** table, 11 refs.—A survey of the atmospheric pollen carried out at Almora for one year beginning from 12 Feb. 1954 has revealed that the pollen content of the atmosphere is maximum twice in the year—during March–April and during October—and minimum in July and December. The most abundant pollen has been found to be that of *Quercus*. *Subject Headings:* **1. Pollen surveys 2. Almora, India.**—*Authors' abstract.*

12.11–193 542.8:546.224:547.21:551.510.42

†Renzetti, N. A. (*Air Pollution Foundation*) and Doyle, George J. (*Stanford Res. Inst.*), **Photochemical aerosol formation in sulfur dioxide-hydrocarbon systems.** *International Journal of Air Pollution*, London, 2(4):327–345, June **1960.** 8 figs., 7 tables, 31 refs., 17 eqs. **DWB, DLC**—We have conducted a series of photochemical experiments in a 50–1 stirred-flow reactor to study aerosol formation from different hydrocarbons in the presence of nitrogen oxides and sulfur dioxide. Irradiation by simulated sunlight of trace concentrations (p.p.m.) of the reactants, in some cases, yielded particles in the size regime 0.1–0.3 diameter, which by scattering of light are important to visibility in the atmosphere. A large number of experiments with 3 p.p.m. of various hydrocarbons, 1 p.p.m. nitrogen oxides, and 0.1 to 0.5 p.p.m. SO_2 indicated that the olefinic hydrocarbons were the only important aerosol formers in contrast to the paraffinic and aromatic hydrocarbons. It was observed that the photolysis of sulfur dioxide proceeds at the rate of 0.4% per minute which is considerably above that observed by Johnstone and Gerhard (1955). The high sulfate content of the particulate matter and low gaseous sulfur dioxide concentrations observed in the Los Angeles smog are consistent with the findings of this laboratory program. *Subject Headings:* **1. Photochemical aerosol formation 2. Sulfur dioxide-hydrocarbon systems 3. Aerosol formation.**—*Authors' abstract.*

12.11–194 551.551.8:551.510.42:628.53

†Wippermann, F. and Klug, W., **Schornsteinmindesthöhen, ihre Bestimmung aus Gesetzmässigkeiten der turbulenten Diffusion in der Atmosphäre.** [Determination of minimum heights of smoke stacks from the laws of turbulent diffusion in the atmosphere.] Verein Deutscher Ingenieure. Kommission Reinhaltung der Luft, Darmstadt, (Unnumbered Technical Report), July **1960.** 48 p. 6 figs., 4 nomographs, 21 refs., 60 eqs.—In this highly

theoretical paper the following expression is derived

$$H_{\min}=\left\{\frac{2\hat{Q}_{k,\tau}\tau A}{\pi e\bar{u}_{\hat{\xi}}^{2}(\overline{S_k})_{\tau,\mathrm{mik}}}r^{r}\Gamma^{r-1}\Lambda^{\frac{1}{2}}\right\}^{1/2r}-E^{*}(\bar{u}_{\hat{\xi}})^{b}$$

$H_{\min}$ is the minimum height of a smokestack, $\hat{Q}H_{k,\tau}$ is a corrected value of the amount of g ejected per unit time, A is a parameter characterizing the degree of anisotropy of turbulenc $\bar{u}_{\hat{\xi}}$ is the wind velocity, averaged over the time interval $\hat{\xi}$, $(\overline{S_k})_{\tau,\mathrm{mik}}$ is the maximum permissib admixture concentration (milligrams per m^3) of the gas "k" during the time τ. r gives measure of the increasing dimensions of the smoke plume with increasing distance from t source, E^* is the rate of gas emission from the stack. Λ and Γ are abbreviations for functio which express the turbulent conditions offlow; b relates the effective height of the stack, whi usually is greater than its actual height (due to the buoyancy and the "jet"-effect of the eject hot gas), with the mean wind speed. Several simplifications to this complicated expression a discussed, and nomograms as well as calculated examples show the applicability of the theo to practical requirements of air pollution prevention. *Subject Headings:* **1. Turbulent diffusi 2. Smokestack height determination 3. Air pollution prevention.**—*E. R. Reiter.*

TROPOSPHERE—TROPOPAUSE—THERMOSPHERE (551.510.52/53)

See also: **Dynam. study of 1958–1959 stratos. polar vortex** (Boville), 12.11–47; **Atmos. reflection and long distance propagation** (Misme), 12.11–101; **Monthly mean 50 mb and 100 mb charts** (Panofsky), 12.11–158; **Large scale atmos. perturbations** (Matsuoka), 12.11–226; **Infrared radiation meas. near tropopause** (Darkow), 12.11–248; **Diurnal temp. var. in lower layers of atmos.** (Gandin et al.), 12.11–255; **Wind and temp. fields of upper tropos. and lower stratos.** (Chiu), 12.11–301; **Air currents in stratos.** (Dubentsov), 12.11–302; **Atmos. ozone and zone of max westerlies, 200 mb level** (Shimizu), 12.11–303; **Weak wind layer in lower stratos. as zero layer** (Faust), 12.11–304; **Diurnal var. of stratos. winds** (Mantis), 12.11–305; **Electrostatic field in free atmos., IGY invest.** (Imianitov, Chubarina), 12.11–396.

12.11–195 551.501.81:551.510.52

Kostarev, V. V., **Opyt radiolokatsionnogo zondirovaniia troposfery.** [Progress in tro spheric sounding by means of radar.] *Moscow. Tsentral'naia Aerologicheskaia Observator Trudy*, No. 20, **1958.** p. 3–16. 6 figs., table, ref., 14 eqs. **DWB**—In recent years the of radar for soundings in the free atmosphere has significantly increased. Experience shown that radar data not only complement data obtained by other means, but in cert cases have definite advantages. Certain improvement in radar equipment is discussed. description of equipment at a special radar station designed for troposphere soundings is giv Methods of observation and certain characteristics of parabolic antenna of large dimensi are described and the mathematical formulas given. The results of experimental soundi of the troposphere are discussed in great detail. *Subject Headings:* **1. Tropospheric ra soundings 2. Parabolic radar antenna.**—*B.J.G.*

12.11–196 551.510.528:551.590

Rasool, Ishtiaq, **Relations entre la hauteur de la tropopause et l'activité solaire.** [R tionships between tropopause altitude and solar activity.] *Académie des Sciences, Pa Comptes Rendus*, 250(22):3696–3697, May 30, **1960.** 2 refs. **DWB, DLC**—Study based observations of the altitude of the tropopause at the aerological stations of Trappes, Alg Colomb-Béchar, Dakar, Bangui and Leopoldville during the period 1954–1958. The tro pause altitude increases when the number of sunspots increases, this effect being more marke latitude is lower. The geographic distribution gives evidence of an influence of the magn equator, the variation of the altitude of the tropopause according to the number of suns passing through a maximum at the magnetic equator. *Subject Headings:* **1. Upper air analysis 2. Solar activity—tropopause height relationships 3. Latitude effects on tropopa height variations.**—*A. V.*

12.11–197 551.510.53:546.33/4:551.507.362.1

Blamont, J.; Lory, M. L. and Courtès, G., **Réactivité du sodium et du lithium dans la haute atmosphère.** [Reactivity of sodium and lithium in the high atmosphere.] *Annales de Géophysique*, Paris, 16(4):435–444, Oct./Dec. **1960.** 14 figs., 2 plates, 3 tables, 6 refs. French, English and Russian summaries p. 435. **DLC**—Determination of the time constant of disappearance of sodium and lithium at an altitude of 190 kms from the D_2/D_1 ratio of the resonance lines emitted by man-made alkali clouds. The clouds of alkaline metals (sodium, potassium, lithium) form in the atmosphere through direct and continuous ejection from Veronique rockets. The intensity ratio of the lines D_1 and D_2 is determined by means of two Fabry-Perot interferometers. The curve of theoretical variation of the resonance doublet intensity ratio and the measurements of the intensities ratio D_2/D_1 make it possible to deduce the optical thickness of the cloud (number of atoms per cm^3). The measurements of optical thickness are discussed and the speed of reactions between the alkalines and the constituents of the upper atmosphere is determined. The speed of disappearance of the two alkalines at 190 kms seems relatively great and is of the order of one hour. It corresponds in fact to the setting up of the various local photochemical equilibriums and the diurnal or seasonal fluctuations in the intensity of the sodium and lithium lines have no relationships with the origin of exterior elements as e.g., a meteorite shower. *Subject Headings:* **1. Upper air chemistry 2. Sodium in upper atmosphere 3. Lithium in upper atmosphere 4. Véronique rockets.**—*A. V.*

12.11–198 551.510.53:546.17:546.211

†Danilov, A. D., **K voprosu ob obrazovanii NO^+ v verkhneĭ atmosfere.** [Formation of No^+ in the upper atmosphere.] *Iskusstvennye Sputniki Zemli*, Moscow, No. 5:60–65, **1960.** 4 figs., 3 tables, 18 refs., 7 eqs. **DLC**—The process of ions recharging the atomaric (atomic) oxygen with molecules of nitrogen giving ions of NO^+ has been studied by many Soviet and foreign investigators. These studies are reviewed in detail and illustrated with tabulated data, which are analyzed and plotted on charts in reference to different altitudes from 120 to 400 km. *Subject Heading:* **1. NO^+ in the upper atmosphere.**—*N.P.S.*

12.11–199 551.511.3:551.510.53

Starr, V. P. (*M. I. T., Camb., Mass.*), **Questions concerning the energy of stratospheric motions.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, Vienna, 12(1):1–7, **1960.** 5 refs., 12 eqs. English, German and French summaries p. 1. **DLC.** Also issued as: Massachusetts Institute of Technology. Dept. of Meteorology, Contract AF 19(604)-5223 (Planetary Circulation Project), Scientific Report, No. 1, Dec. **1959.** 11 p. 5 refs., 12 eqs.—In this article the theoretical conclusion is reached that the vertical transport of kinetic energy in the atmosphere from one horizontal layer to another is effected soley by an area integral over the internal boundary, of the kinetic energy per unit volume multiplied by the vertical velocity. Speculations are made as to whether the kinetic energy in stratospheric levels is maintained against friction through such a vertical transport from other levels, or whether the needed supply is derived from convective sources *in situ*. *Subject Headings:* **1. Stratospheric motion 2. Vertical transfer of energy.**—*Author's abstract.*

OZONOSPHERE (551.510.534)

12.11–200 551.510.534:551.590.24

Fesenkov, V. G. (*Acad. Scie. Kaz. SSR*), **On the investigation of atmospheric ozone by photometry of lunar eclipses.** *Soviet Astronomy AJ*, New York, 3(4):554–562, Jan./Feb. **1960.** 6 figs., 3 tables, 2 refs., 5 eqs. **DLC.** Transl. of original Russian in *Astronomicheskiĭ Zhurnal*, Moscow, 36(4):564–572, July/Aug. **1959. DLC**—The illuminations at different phases of an eclipse are calculated for a standard atmosphere without ozone and also for an ozone admixture with different distributions with height above sea level. The results are summarized in Table 3. In this table are given: 1) the different limiting heights in the atmosphere still illuminated by solar rays, as it appears from the moon; 2) the corresponding phase angles for the area of the moon being observed, i.e., the angular distance of the area from the center of the earth's shadow; 3) the illumination l/l_0 for $\lambda = 0.5\mu$, calculated for a

standard atmosphere without ozone in units of illumination produced by an uneclipsed su
4) and 5) the same as 3) but for an ozone admixture with a total vertical thickness equal t
0.031 and a maximum concentration at heights of 21 and 26 km, respectively; 6) and 7) th
absorption due to ozone under these conditions, expressed in stellar magnitudes. From a
analysis of photometric curves, similar to those in Figs. 2–6, it is possible to determine th
distribution of ozone with height and also the total amount of ozone in the atmosphere. *Subje
Headings:* **1. Lunar eclipses 2. Photometric observation techniques 3. Ozone amou
4. Vertical ozone distribution.**—*Author's abstract.* Ⓢ

12.11–201 551.510.534(49

*Perl, G. and Dütsch, H., **Die 30 jährige Aroser Ozonmessreihe.** [Thirty years of ozo
measurements at Arosa.] *Switzerland. Meteorologische Zentralanstalt, Annalen*, 95, Anla
No. 8. 1958, pub. **1959.** 10 p. tables, 2 refs. **DWB**—Continuous observations of t
total amount of ozone were started by F. W. Götz in 1926. Apart from a short interrupti
in 1929/1931 they have been carried on up to the present. This 30-year series of observatio
is practically homogeneous due to the great effort made by Götz in this respect. All valu
in the tables of this article are given in the scale introduced with the new photoelectric Dobs
instrument in 1939, based on the absorption-coefficients of Ny and Choong, and are expres
in units 10^{-3} cm ozone NTP. The ozone values observed before 1939 with the old photograph
Dobson instrument have been multiplied by 0.88 for reduction to this scale. Though
decision of the International Ozone Commission a new scale was introduced on July 1, 19
(based on Vigroux's new determination of the absorption-coefficients) the old scale was us
in this publication through the end of 1958. *Subject Headings:* **1. Ozone data 2. Ozo
observation techniques 3. Arosa, Switzerland.**—*Authors' abstract.*

12.11–202 551.521.17 551.510.5

Sekera, Z. (*Univ. Calif.*) and Dave, J. V. (*Imperial College of Science & Tech., Londo
Diffuse transmission of solar ultraviolet radiation in the presence of ozone. *Astrophysi
Journal*, Chicago, 133(1):210–227, Jan. **1961.** 7 figs., 2 tables, 15 refs., 6 eqs. **DWB, DLC**
The problem of diffuse transmission of solar ultraviolet radiation in the presence of ozo
absorption has been solved theoretically. The plane-parallel atmosphere is divided into t
layers. Ozone is assumed to be distributed according to photochemical theory in the up
layer, whose scattering optical thickness is small, and hence only primary scattering is tak
into consideration in this layer. The scattering optical thickness of the lower layer is lar
and hence all the orders of scattering have been considered. However, it is assumed th
there is no ozone in the lower layer. It is shown that the intensity of skylight received at t
bottom of the atmosphere consists of seven different components originating strictly from t
upper or lower layer as a consequence of illumination by direct solar radiation or as a res
of diffuse illumination of one layer by the other. The results of computations for the direct
of observation toward the zenith are presented for several positions of the sun and for seve
absorption optical thicknesses of the upper layer. The effect of multiple scattering on t
observed "Umkehr" curve, used in the determination of vertical distribution of ozone fr
ground stations, is also discussed. *Subject Headings:* **1. Solar ultraviolet radiation 2. Ozo
absorption.**—*Authors' abstract.*

12.11–203 551.510.534.551.501.7:551.590

Yamasaki, M., **Observations on the total amount of ozone during the solar eclipse
April 19, 1958.** *Journal of Meteorological Research*, Tokyo, 11(2):131–134, Feb. **1959.** f
3 tables, 3 refs., 5 eqs. In Japanese. **DWB**—The total amount of ozone in the atmosph
was observed during the solar eclipse of April 19, 1958 at five aerological observatories: Sapp
Tateno, Kagoshima, Torishima and Minamitorishima, located between 24°17′N–43°03′N a
141°20′–155°58′E the instrument used was a spectrophotometer. The paper presente
method of ozone calculation, wave length (A.D.) by difference method and constant va
used at each observatory as well as atmospheric correction. Generally, the variation
amount of ozone (Fig. 2) was not remarkable throughout the observations, but some decre
and increase of ozone amount before and 20 minutes after the solar eclipse was due to the f

that there was a cyclone at the eastern sea of Hokkaido and anticyclone at the southern sea of Honshu (mainland of Japan). *Subject Headings:* **1. Ozone amount 2. Solar eclipse effects on ozone amount 3. Upper air observation techniques.**—*K.C.*

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE (551.511)

See also: **Dynam. study of 1958–1959 stratos. Polar vortex** (Boville), 12.11–47; **Pilot balloon soundings** (Mertsalov), 12.11–155; **Short range forecasting** (Kibel', Sadokov), 12.11–183; **Energy of stratos. motions** (Starr), 12.11–199; **Mechanics of hurricanes** (Jordan, Pfeffer), 12.11–234; **Heat transfer from ground to air** (Priestley), 12.11–263; **Waves in the atmos.** (Donn), 12.11–267; **Turbulence: its mechanism and theory** (Hinze), 12.11–271; **Nocturnal density currents** (Brooks, Schultz), 12.11–279; **Monsoon depression, Bay of Bengal** (Koteswaram, George), 12.11–285; **Steady turbulence in jet stream** (Laĭkhtman, Shnaĭdman), 12.11–306; **Water vapor transport, European U.S.S.R.** (Grigor'eva), 12.11–311; **Climatic var. last 1000 yrs. and geophysical causes** (Flohn), **12.11–374.**

12.11–204 551.509.313:551.511:551.513.1

Lorenz, Edward N. (*M. I. T.*), **Energy and numerical weather prediction.** *Tellus*, Stockholm, 12(4):364–373, Nov. **1960.** 8 refs., 57 eqs. **DLC**—Since the study of energy transformation and the numerical integration of simplified equations are sometimes used as alternative approaches to the same physical problem, it is often desirable that the simplified equations conserve total energy under reversible adiabatic processes. Preferrably, the equations should also conserve the sum of kinetic energy and available potential energy, and they should describe the tendency for static stability to increase as kinetic energy is released. It is found that if the equation of balance is used as a filtering approximation, all the terms in the vorticity equation which involve both the rotational and the divergent part of the wind field should be retained, while, if the geostrophic equation is used, all of these terms in the vorticity equation should be omitted, if the equations are to possess suitable energy invariants. An 8-layer model with the appropriate energy invariants is developed. The two-layer model may be the simplest possible model with variable static stability. The model appears to be suitable for theoretical studies of the general circulation. *Subject Headings:* **1. Numerical forecasting 2. General circulation models 3. Energy transformation.**—*Author's abstract.*

12.11–205 551.511:551.509.313

Miyakoda, K. (*Tokyo Univ.*), **Numerical calculations of Laplacian and Jacobian using 9 and 25 gridpoint systems.** *Meteorological Society of Japan, Tokyo, Journal*, Ser. 2, 38(2):94–106, April **1960.** 13 figs., table, 8 refs., 5 eqs. English summary p. 94; Japanese summary p. 106. **DWB, DLC**—In order to reduce the errors in numerical calculations of Laplacian and Jacobian, an attempt is made to extend the gridpoint system from 5 to 9 or 25 points. The truncation errors are divided into two kinds; one is symmetrical and the other orientational. The author asserts that in order to get high accuracy of calculation, not only the former error but also the latter must be reduced, which has been apt to be neglected. Taking some examples of patterns, numerical calculation schemes of Laplacian and Jacobian are tested by comparing the numerical with the analytical values. *Subject Headings:* **1. Laplacian and Jacobian calculations 2. Numerical forecasting.**—*Author's abstract.*

12.11–206 551.511:551.513.2

*Starr, Victor P. (*M. I. T.*), **Further statistics concerning the general circulation.** *Tellus*, Stockholm, 11(4):481–483, Nov. **1959.** table, 11 refs. **DLC**—The work of Saltzman (1957, 1958) consists of a plan to study the transfers of kinetic energy from the eddies to the mean zonal motions by use of the technique of spectral analysis. The findings in this connection obtained from the analysis of a complete year of geostrophic data were reported recently. With reference to their findings and in order to provide a comparison, this paper makes available the outcome of computations from actual wind data for an additional year. These pertain to the calendar year 1951—the same period as was used by Saltzman and Fleischer (1959). *Subject Headings:* **1. General circulation statistics 2. Wind data.**—*I.S.*

12.11–207 551.511.2:551.553.12(234

Borisova, S. V. and Burman, E. A., **O kinematike mestnykh vetrov Alazanskoĭ doli** [Kinematics of local winds in the Alazan Valley.] *Akademiia Nauk SSSR, Izvestiia, S Geofiz.*, No. 1:169–173, **1960.** 3 figs., table, 2 refs. **DLC**—The geography of the Ala Valley which is located in the valleys of the Alazan and Archigai Rivers along the south foothills of the principal Caucasus Range is described briefly and the results of observati of the prevailing wind regime of the valley are discussed. The winds can be classified i longitudinal (along the valley) and transverse (perpendicular to its axis) as a result of relief of the valley. This study is devoted chiefly to the characteristics of the transv circulation for which data on transverse wind components are used. Several types of tr verse winds were found in the valley. The pattern of the transverse circulation differs f the general pattern of mountain valley winds. By day the air flows from the slopes of Caucasus Range, transverses the valley and rises along the opposite slope. At 1000 m ab the bottom of the valley a flow in the opposite direction is observed and the circulation rin closed. At night also there is present a general circulation ring embracing the entire cr section of the valley with a direction opposite to the diurnal one. The shift in the direc of the transverse circulation occurs in the morning at 9–10 hours and in the evening a sunset. The mean velocity in the lower half of the diurnal ring is 4 m/sec, at night it va between 2–3 m/sec. The peculiarity of the transverse circulation in the Alazan Valle that it is directed from slope to slope and in the course of twenty-four hours it changes t into the opposite. The transverse wind is more like a breeze than a mountain valley w The breeze character of the wind is a consequence of the temperature contrast between slopes which exceeds the corresponding contrasts between the slopes and the free atmosp *Subject Headings:* **1 Kinematics of local winds 2. Mountain and valley winds 3. Al Valley, Caucasus Mts., U.S.S.R.**—*I.L.D.*

12.11–208 551.511.2:533.7:53

Van Mieghem, J., **Les bilans énergétiques et l'hypothèse quasi statique.** [En balance and the quasi-static hypothesis.] *Journal de Mécanique et de Physique de l'A phère*, Paris, Ser. 2, 2(5):1–6, Jan./March **1960.** 7 refs., 20 eqs. French, English and Sp summaries p. 1. **DWB**—The basic energy equations of the atmosphere are reviewed transformed into three different forms of balance equations. The author expresses the variation of the quantity of a form of energy within the volume unit as a function of a of energy and of the rate of energy production. It is then shown how the quasi-stati pothesis must be introduced in these equations. This makes it possible to show that i atmosphere the correlation between the specific volume of air (α) and the speed comp following the ascending vertical (ω), and between the absolute temperature and ω is neg i.e., that in isobaric surfaces, the large (positive) values of α and T generally correspond t negative values of $\omega(\omega<0)$ and the small (positive) values of α and T, to the positive valu $\omega(\omega>0)$. Therefore it results that, as a rule, warm air has an upward motion throug isobaric surfaces, whereas cold air has a downward one. The total potential energy is th transformed into kinetic energy. *Subject Headings:* **1. Energy balance of the atmos 2. Energy equations 3. Potential energy-kinetic energy conversion.**—*A. V.*

12.11–209 551.511.3

Fjortoft, R. (*Norwegian Met. Institute*), **On the control of kinetic energy of the atmos by external heat sources and surface friction.** *Royal Meteorological Society, Quarterly Jo* 86(370):437–453, Oct. **1960.** 3 figs., table, 60 eqs. **DLC, DWB**—A theoretical treatm the energy transformations of the atmosphere. It is shown that the long-term behavior atmosphere is defined externally by the sun and the earth's surface. The external heat-s and surface friction control the kinetic energy of the atmosphere. Firstly, the motion air, by constantly rearranging the temp. distribution, produces kinetic energy again dissipative loss of friction. Secondly, the frictional drag which rotates the atmospher the earth gives it an important dynamical property. Thirdly, the dissipation of energy is influenced by the character of the roughness of the earth's surface. *Subject Hea* **1. Energy transformation 2. Surface friction effects 3. Kinetic energy in atmosphere.**

12.11–210 551.511.3

Magata, M. (*Met. Res. Inst.*), **On the approximate solutions of the barotropic vorticity equation.** *Meteorological Society of Japan, Tokyo, Journal*, Ser. 2, 38(2):80–93, April 1960. 7 figs., 2 tables, 7 refs., 55 eqs. English summary p. 80; Japanese summary p. 93. **DWB, DLC**—The truncation error of difference solutions of the barotropic vorticity equation is considered, and it is shown that the physical phase velocity of the difference solution of the linearized vorticity equation becomes smaller than that of the true solution as an effect of use of the space difference, and larger as an effect of the time difference. And a method eliminating the computational noises which originate from the time difference is given. Some considerations on the truncation error of the non-linear term are also presented. Next, approximate solutions by the perturbation method are considered, and as an example of this method the problems on the energy exchange between the disturbances and general current are discussed. In the case of the long wave length disturbances good approximate solutions can be obtained, but in the case of the shorter wave length disturbances cannot. As necessary conditions for obtaining the approximate solutions, the laws of kinetic energy conservation and the momentum transfer on the variation of the general current are adopted. *Subject Headings:* **1. Barotropic vorticity equation 2. Truncation errors.**—*Author's abstract.*

12.11–211 551.511.33

Gruza, G. V., **O mezhdushirotnom teploobmene v severnom polusharii.** [Interlatitudinal heat exchange in the Northern Hemisphere.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 2:341–345, Feb. **1960.** 6 figs., table, 8 refs., 3 eqs. **DLC**—The mechanism of macroturbulent heat exchange in the Northern Hemisphere was investigated by means of daily maps of absolute topography of the 700 mb surface and the relative topography (OT^{500}_{1000}) by using a grid for calculating 36 points for each latitude between 30 and 80°N lat. The equations for computing the density of macroturbulent heat flux, the coefficient of horizontal macroturbulent heat exchange and the loss or accumulation of heat at any latitude zone relative to unit area as a result of divergence of macroturbulent heat flow, and isopleth diagrams giving the zonal values of OT^{500}_{1000}, meridional gradient temp., latitude-time variation of the coefficient of macroturbulent exchange, etc. are presented. The regulating role of the Polar Region in the temp. regime of the troposphere is indicated by the increase of the annual amplitude with latitude and the retardation of the extremes in lower latitudes relative to higher latitudes. The magnitude $\delta\Phi$—interlatitude temp. gradient—is associated with the zonal terms of the thermal wind at the 500 mb surface, influencing fundamentally the wind regime at this height. The variation of the temp. field is associated closely with the meridional heat flux which has greater interlatitudinal intensity in winter than in summer. The isopleths of accumulation of heat as a result of divergence of meridional flux indicate that the zone of continuous heat loss by air currents lies in winter south of 75° and in summer it embraces the entire region between 65 and 75° lat. The variation of K_T, coefficient of horizontal macroturbulent heat exchange, is generally smaller than the density of turbulent heat flux. *Subject Headings:* **1. Macroturbulent heat exchange 2. Atmospheric turbulence 3. Northern Hemisphere.**—*I.L.D.*

12.11–212 551.501:551.511.33 551.525.2:551.524

Kiss, Erzsébet (*Toth*), **Különböző talajok fölötti légrétegek hőforgalma a Balaton térségében.** [Atmospheric heat balance over various soils in the Lake Balaton region.] *Időjárás*, Budapest, 63(3):154–158, May/June, **1959.** fig., 2 tables, 2 refs., 6 eqs. Hungarian and Russian summaries p. 154. **DLC**—This is an application of the method determined by Abukov and Monin for the computation of the atmospheric heat transferred by turbulent flow changes at various levels. Table 1 presents the mean value of heat balance measured at three observation stations in the Lake Balaton region. A comparison is made of daily values: a) of the atmospheric heat transferred by turbulent flow change, b) of the heat used in evaporation process and c) of the heat obtained by global radiation. Table 2 presents a daily survey of thermal advection under various weather conditions. *Subject Headings:* **1. Heat balance over soil 2. Thermal advection 3. Lake Balaton region, Hungary.**—*Transl. of author's summary* (*E.K.*)

12.11–213 551.511.3

Semenov, V. G., **Sootnoshenie mezhdu advektivnoi i turbulentnoi sostavliaiushchim perenosa tepla v atmosfere.** [The correlation between the advective and turbulent components of heat transmission in the atmosphere.] *Meteorologiia i Gidrologiia*, No. 10:3– Oct. **1959.** 2 tables, 6 refs., 4 eqs. **DWB, DLC**—An attempt is made for evaluation of t correlation between the advective and turbulent components of definite atmospheric process during one month. Various methods of computation of advection with integral equatio are reviewed, including a simple thermodynamic equation, with horizontally changing te peratures and pressures, proposed earlier by the author. The results, computed with differe methods for the 12 month period, are tabulated. The analysis leads to the development o new thermodynamic (four member) equation for advective and turbulent components. T advective component of the heat flow during the 1950–52 period was computed on the da observed in various remote areas of U.S.S.R. for 5 and 10 day periods. The results are tab lated (Table 2) with indication of positive and negative anomalies in the temperatures c responding to the retained and transmitted heat. However, the quantitative indication advective and turbulent components is found extremely complicated in view of many unkno factors affecting the temperature of air. *Subject Headings:* **1. Heat transfer 2. Advecti heat flow 3. Turbulent transfer of heat.**—*N.P.S.*

12.11–214 551.511.33:551.558.21:551.43(235.

Yeh, Tu-cheng; Lo, Szu-wei and Chu, Pao-chen (*all, Inst. Met. Geophy.*), **The wind str ture and heat balance in the lower troposphere over Tibetan Plateau and its surroundin** *Acta Meteorologica Sinica*, Peking, 28(2):108–121, **1957.** 11 figs., 13 refs. In Chine English summary p. 121. **DLC**—First, the mean 2-year mean winter and summer wind fie below 6 km over the Tibetan Plateau and its surroundings are presented. In winter, the m features at the 1.5 km and 3 km level are the splitting of the westerlies over the plateau, line of convergence to the east of the plateau and the "dead-water" regions (characterized calm wind and little disturbance, except small local vortices) respectively, to the east and w of the plateau. At the 6 km level the minor features disappear but the splitting is still evide In summer in the vicinity of the plateau low level wind blows cyclonically around it. S rounding this large cyclonic whirl are small systems. At the 6 km level the wind blows a cyclonically around the plateau. The center of this anticyclone may be located at the corner of the plateau. This kind of vertical structure of this wind field indicates that temperature over the plateau is higher than the surrounding. The region of high temperat is estimated to reach at least as high as 9 km. There is strong vertical motion in the vicin of the plateau. In winter on its SE the motion is upward, while in the rest of the region motion is in the main downward. In summer the mean motion (fundamentally upw velocity) reaches about 1 cm/sec at 6 km. Mean advection and temperature gradient betw 3–6 km are also calculated from the wind data under geostrophic assumption. Secondly, heat balance over the plateau is estimated from the calculation of short wave absorpt condensation heating, long wave cooling, temperature advection, adiabatic cooling (or wa ing) due to vertical motion and turbulent heat transfer from the ground. From this calcula it is concluded that the Tibetan Plateau is a heat source in summer, while in winter the re is not very conclusive. Probably in winter the SE part of it plays a role of warm source w the rest of the plateau plays a role of cold source. *Subject Headings:* **1. Vertical wind fi 2. Heat balance 3. Orographic effects on circulation 4. Tibetan Plateau.**—*Authors' abstr*

GENERAL CIRCULATION (551.513)

See also: **Dynam. study of 1958–1959 stratos. polar vortex** (Boville), 12.11–47; **Energy and numerical weather prediction** (Lorenz), 12.11–204; **Statistics concerning gen. circulation** (Starr), 12.11–206; **Temp. regime and local atmos. circulation, Sukhumi** (Kvaratskheliia), 12.11–252); **Items** 12.11–281 to 12.11–287; **Precip. during cyclone with meridional circulation, Hungary** (Rákóczi), 12.11–333; **Variations in European climatic temp.** (Portig, Fay), 12.11–375.

12.11–215 551.513

Krichak, O. G., **Osobennosti atmosfernoi tsirkuliatsii nad Antarktikoi i ee sviaz's tsi liatsieĭ Iuzhnogo polushariia.** [Characteristics of atmospheric circulation over Antar

and its relationship to the circulation in the Southern Hemisphere.] *Akademiia Nauk SSSR. Mezhduvedomstvenny Komitet po Provedeniiu MGO, Sbornik Statei II Razdel Programmy MGG Problemy (Meteorologiia)*, No. 1:28–71, **1960.** 31 figs., 14 refs. **DWB** (M(055) N418nc) —This detailed study of the atmospheric circulation over Antarctica is based upon surface and high altitude maps made during the wintering of the Second Soviet Continental Antarctic Expedition in 1957. The contents of this study include the following: an analysis of the geographical factors responsible for atmospheric processes over Antarctica as indicated by synoptic, kinematic, surface and AT_{500} maps for May–December 1957; maps showing region of prevailing position of ridges in the lower levels of the atmosphere and maps of frequency of cyclones during the period March-December 1957, etc. A discussion of the meridional processes in the high latitudes of the Southern Hemisphere; the Antarctic anticyclone and its role in the circulation processes of the Southern Hemisphere; the invasion of cyclones into the Antarctic continent; the trajectory of moving and the position of quasistationary cyclones and anticyclones (indicated on a map for 1957); precipitation in the interior continental regions, and local conditions involved in the origin of strong winds. *Subject Headings:* **1. Atmospheric circulation 2. Antarctic circulation 3. Southern Hemisphere circulation.**—*I.L.D.*

12.11–216 551.513:061.4

Lamb, H. H., **Representation of the general atmospheric circulation: an exhibit in the Royal Society exhibition.** *Meteorological Magazine*, London, 89(1,061):319–330, Dec. **1960.** 3 plates, 2 figs., 22 refs. **DWB, DLC**—The exhibit was organized jointly by the Meteorological Office and the National Institute of Oceanography. Some instruments and models of a weather ship and of oceanographic research vessels were shown. The main display panel consisted of a cross-section through the atmosphere from the North Pole to the South Pole in January, up to a height of 30 km and through the entire depth of the ocean taken near 30°W. This cross-section is reproduced in this paper and its main features are discussed. A more detailed diagram is also given for the atmospheric cross-section together with a similar diagram for July. The mean January and July circulation patterns were also depicted on globes. In addition figures are given in this paper of cross-sections between the North and South Poles in 150°E and 30°W showing the mean zonal wind components up to 30 km in January and July. This paper contains a fairly lengthy discussion of the main features of the general circulation and their various implications. *Subject Headings:* **1. Meteorological exhibitions 2. Atmospheric circulation.**—*R.B.*

12.11–217 551.513

†Morskoĭ, G. I., **O zonal'noĭ tsirkuliatsii atmosfery.** [Zonal circulation of the atmosphere.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 85, **1959.** p. 40–63. fig., 4 tables, 84 refs., numerous eqs. **DWB**—This study of the zonal circulation of the atmosphere is an examination of the problems associated with the formation and evolution of the so-called profile of westerly winds. The zonal circulation is here considered as the planetary zonal components of the general atmospheric circulation, i.e., the averaged values along an entire circle of latitude. Accordingly the components of velocity directed along the circle of latitude (Vy) can vary perceptibly with longitude (λ), but if $v_r = \frac{1}{2\pi}\int_0^{2\pi} u\lambda\alpha\lambda$ differs from zero then a zonal circulation is present. Studies on the general circulation, beginning with the work of Helmholtz and ending with the most recent research, are reviewed in detail. The relationship of the structure of the zonal profile and the circulation index is examined and it is shown that introducing the construction of profiles of westerly winds into studies of the atmospheric circulation by no means displaces the use of the circulation index; the index of circulation expresses the hypothesis of "solid rotation of the atmosphere" while the profile of structure indicates that the hypothesis is applicable purely to the entire Northern Hemisphere. The fluctuation of the circulation index has led to the concept of index cycle having stages corresponding to specific types of synoptic processes. The forecasting of the length of the cycles thereby improving the quality of long range forecasts is discussed and the equations for determining the geopotential, zonal temperature and circulation index are presented. The problem of zonal circulation is then analyzed by employing a nondynamic approach especially

for cases when nonstationary processes are studied. Pressure (in geopotential) and te perature are determined from the equation of state and the equation of the first law of therm dynamics. Velocity expressions (as functions of ρ and H) are obtained from the equati of motion. Vertical motion is determined from the equation of continuity. The differen equations for H and T are derived. *Subject Headings:* **1. Zonal circulation 2. Westerly w profiles 3. General circulation 4. Circulation index 5. Long range forecasting.**—*I.L.D.*

12.11–218 551.589.5:551.513 551.509.3

*Wollkopf, K.-H., **Die Umsteuerungen der Grosswetterlagen.** [Changes in large sc pressure patterns.] *Zeitschrift für Meteorologie*, Berlin, 14(4):85–94, April **1960.** 2 fi 7 tables, 2 refs. German and English summaries p. 85. **DWB, DLC**—Using the **Katalog Grosswetterlagen** (Hess and Brezowsky) statistical treatment was applied to the occurren of significant change of large scale pressure patterns (Grosswetterlagen) of the 1881 to 1 period. Related to each primary situation relative frequencies of the subsequent situati are established for the year, and for summer and winter, respectively. Some instances of s significant shifts whose relative frequencies show a marked deviation from the empir probabilities of the subsequent situations, important differences of relative frequencies comparable cases of significant shifts, and some features of summer and winter are submit and discussed. *Subject Heading:* **1. Large scale pressure patterns.**—*Author's abstract.*

12.11–219 551.513:551.515

Yabana, W., **On the relation between the atmospheric long wave and the long ra weather trend in summer.** *Journal of Meteorological Research*, Tokyo, 12 (4):216–220, A **1960.** 6 figs., 3 refs. In Japanese; English summary p. 216. **DWB, DLC**—Statistical stu are made on the relation between atmospheric long waves ($n=1, 2$) computed by harmo analysis of 5-day mean 500 mb height along the 50°N parallel and the long range weather tr in summer, 1948–1958 (except 1954, 1955). (1) In rainy season, the position of trough wave number 1 deviates westwards from the normal position of about 140°W, and the amplit increases. While in summer the position of trough deviates eastwards from 140°W to ab 20°E, and the amplitude decreases. In autumn, the trough deviates rapidly westwards f 140°W and lies near 140°W to 140°E, and the amplitude again increases. (2) In cool sum the position of trough for wave number 1 lies westward of 140°W, normal position, whil hot summer eastward. (3) Typhoons tend to develop when the trough for wave numb lies near the eastern Pacific Ocean. (4) The typhoons tend to form near the trough of w number 2. *Subject Headings:* **1. Long waves in the atmosphere 2. Long range weather tre 3. Typhoon formation.**—*Author's abstract.*

12.11–220 551.577.32:551.513.2:551.5

Yamamoto, T., **On the basic situation of 500 mb height pattern and its variation in B season.** *Journal of Meteorological Research*, Tokyo, 13(1):12–20, Jan. **1961.** 8 figs., 5 In Japanese; English summary p. 12. **DWB, DLC**—Analyzing the distribution of 10- mean deviation from normal 5-day mean 500 mb height in Bai-u season, it was noticed there were the minimum areas of mean deviation, one of which extends eastward from North Pole through the northern Kamchatka Peninsula and the other extends east starting at the middle part of China corresponding to the path zones of anticyclone, and maximum areas of mean deviation, one of which extends eastward from north of Lake Ba through the Okhotsk Sea and the other extends southeastward from north of Lake Ba through the Yellow Sea corresponding to the zones of cyclone, during June 30 to July 4. it was shown by the example of analysis in June 1957–1959 that the behavior of Bai-u cha according to the shift of the maximum and the minimum areas. *Subject Headings:* **1. 50 height pattern variations 2. Bai-u variations 3. Synoptic analysis 4. Far East.**—*Aut abstract.*

12.11–221 551.513.1:551.577.38(4

Berko, M., **Odvisnost sušnih razdobij v Sloveniji od splošne cirkulacije atmos** [General circulation of the atmosphere and dry periods in Slovenia.] *Drustvo Meteoro Slovenije, Ljubljana, Meteorološki Zbornik*, 2:37–47, 1959. 6 figs., 5 refs. English sum

p. 46. **DWB** (M(055) D797me) -In this paper the factors in the general circulation responsible for the occurrence of dry periods in Slovenia are investigated. The period covered is from 1954 to 1959 treating the warm half of each year from May to October. Maps showing the deviation of the surface pressure from the mean values for a dry period and maps of the average contour lines of the absolute topography of the 500 mb surface are presented. The average movement and stopping of the core areas of the cyclones and anticyclones during the time of dry periods are graphically illustrated. Evidence suggests that the occurrence of the dry periods in Central Europe is closely linked to the abnormally high surface pressure in the polar areas and to the low pressure in the equatorial region. *Subject Headings:* **1. General circulation 2. Dry periods 3. Slovenia, Yugoslovia.**—*I.S.*

12.11–222 551.513.1:551.515.127(5–011)

†Chan, Tan, **Analiz struktury volny kholoda nad vostochnoĭ Azieĭ.** [Analysis of the structure of a cold wave over eastern Asia.] *Acta Meteorologica Sinica*, Peking, 29(4):274–286, Nov. **1958.** 7 figs., 22 refs. In Chinese, Russian summary p. 286. **DLC**—This study is an attempt to discover systematic and consistent changes, but not the cause of generation and of change, in the general circulation of the atmosphere over the continent of E. Asia and the western part of the Pacific Ocean where shift air current at the upper frontal surface of a cold wave, vertical motion and circulation at the point of outbreaking, and jet stream and cold trough before and after at the outbreak of cold wave occurred. The study covers the first 17 days of Jan. 1956; 7 contour charts for 200 mb, 500 mb, 700 mb and 850 mb are included. The result shows that in various parts of a cold trough as an element of disturbance of the western stream, the polar front, the subtropical front and the jet stream connected with them, have a varied structure and irregular vertical motion but the vertical current is comparatively systematic. A great difference between E. Asia and North America was proved by comparing with E. PALMEN'S previous research. *Subject Headings:* **1. Upper front and shift current 2. Vertical motion and circulation.**—*M.R.*

12.11–223 551.513.2:551.557.2(510)

Dao, Shih-yen and Chen, Lung-shun (*both, Inst. Geophys. and Met., Academia Sinica*), **The structure of general circulation over continent of Asia in summer.** *Acta Meteorologica Sinica*, Peking, 28(3):234–247, **1957.** 16 figs., 18 refs. In Chinese; English summary p. 247. **DLC**—In this paper, an analysis is made on the structure of the July mean flow field at 850 mb, 700 mb and 500 mb over the continent of Asia during the years 1951–1955 and the mean contours at 200 mb over Asia for July and August, 1956. The vertical cross sections of the mean flow and temperature fields along 75°E, 90°E, 105°E and 120°E for July and August, 1956 have been constructed. The three-dimensional flow structure over the continent of Asia is constituted of the following three basic currents: (1) the westerlies of middle latitudes, (2) the upper level tropical and subtropical easterlies, and (3) the southwesterly monsoon under the upper level tropical and subtropical easterlies. Moreover, the changes of the general circulation over Asia in the transitional period between spring and summer, 1956 is also investigated. It is found that a leaping change of the general circulation over Asia occurs during this period. The upper level subtropical ridge was established over the latitude of Tibet, and over south Asia (to the south of 12°N) a high level easterly jet stream was established. At the same time, the southwesterly monsoon of India and the "Meiyu" (plum rain) season of the Yangtze valley set in. The authors also found that the northward displacement of the rain belt is closely related to the northward retreat and the accompanying weakening in intensity of the westerlies over China main land. *Subject Headings:* **1. General circulation studies 2. Summer circulation 3. China.**—*Authors' abstract.*

12.11–224 551.513.2:551.524.72:551.557

Pogosian, Kh. P., **Sezonnye skhemy obshcheĭ tsirkuliatsii atmosfery.** [Seasonal patterns of the general circulation of the atmosphere.] *Meteorologiia i Gidrologiia*, Moscow, No. 8:3–14, Aug. **1960.** 6 figs., 8 refs. **DWB, DLC**—Using data from 82 radiosonde stations mean cross sections have been constructed showing the zonal wind components and mean isotherms along the 10°W and 144°E meridians in the Northern Hemisphere and between 20–30°E and 160–170°E for the Southern Hemisphere. The cross sections give the mean values for each of the

mid-season months Jan., April, July and Oct. for pressure levels up to 10 mb. The positi of the main jet streams show up clearly and the tropopauses and major frontal divisions marked. In order to show how the main features show up in the actual day to day patte and also to illustrate the possible greater complexity of these patterns two further cross sect were drawn showing mean patterns for the periods 10–11 Jan. 1959 and 3–6 July 1959. T periods were chosen on the basis of availability of data and may therefore be, to some degr considered as randomly chosen. *Subject Headings:* **1. General circulation 2. Jet strea 3. Upper air winds 4. Upper air temperature.**—*R.B.*

ATMOSPHERIC DISTURBANCES (551.515)

See also: **Thunderstorm processes, Transcaucasia** (Guniia), 12.11–27; **World of the wind** (Brown), 12.11–37; **Hurricane effects on forests, Puerto Rico, 1956** (Wadsworth, Englerth), 12.11–92; **Vert. motion and meridional heat exchange . . . comparison with atmos. disturbances, Gulf Stream** (Newton), 12.11–133; **Atmos. long wave-long range weather trend relationships** (Yabana), 12.11–219; **Structure of a cold wave, E. Asia** (Chan), 12.11–222; **Pressure disturbance** (Rikitake, Isozaki), 12.11–268; **Monsoon depression, Bay of Bengal** (Koteswaram, George), 12.11–285; **Precip. meas. and cloud thunderstorm obs. by radar** (Pietka), 12.11–327; **Radar precip. studies improving storm warning network** (Kotov), 12.11–330; **Precip. during cyclone with meridional circulation, Hungary** (Rákóczi), 12.11–333; **Unexpected rainfall, Watnall, Eng., May 18, 1958** (Parrey), 12.11–342; **Air mass transparency, S. Romania** (Andriţoiu), 12.11–384.

12.11–225 550.342:551.515:551.509.

Bukhteev, V. G. and Andreev, T. A., **O vozbuzhdenii shtormovykh mikroseism** [Exc tion of storm microseisms.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 10:1510–15 Oct. **1959.** 5 figs., table, 2 refs. **DLC**—Results of the analysis of the microseismic d obtained by the Far Eastern Seismic stations under supervision of the Sakhalin Scient Research Institute of the Academy of Sciences, U.S.S.R., are described with graphs and a m Attention is given to changes of amplitudes and periods of the microseisms during the mi seismic storms. The periods of the microseisms are found practically the same for differ points of the globe, as is illustrated in the graphs. However, the distribution of periods various stages of development of the storm are different. Beginning of big storms can precisely forecast by short period microseism and movement of the cold front. *Subject He ings:* **1. Microseismic interpretations 2. Storm forecasting from microseisms.**—*N.P.S.*

12.11–226 551.515:551.51

Matsuoka, H. (*Kyoto Univ.*), **Similarity principle applied to large-scale atmosph perturbations.** *Meteorological Society of Japan, Tokyo, Journal*, Ser. 2, 38(4):210–212, **1960.** table, 3 refs., 17 eqs. English summary p. 210. **DWB, DLC**—Treating large-s horizontal atmospheric perturbations in the upper atmosphere as locally similar eddies, author derives the expressions for various fundamental statistical quantities of eddies at latitude in terms of the quantities depending only on the distribution of mean zonal mot However, an examination of the results by MINTZ's data does not give sufficiently satisfac results. *Subject Heading:* **1. Large scale atmospheric perturbations.**—*Author's abstract.*

12.11–227 551.515.11/13

Astapenko, P. D., **Ob atmosfernykh frontakh v Zapadnoĭ Antarktike.** [Atmosph fronts over Western Antarctica.] *Meteorologiia i Gidrologiia*, Moscow, No. 5:23–26, **1960.** fig. **DWB, DLC**—With the aid of a vertical section of the atmosphere over Amun Station for July 26–30, 1958, the author examines the problem of the frontal charact weather changes over the interior continental regions of Antarctica. The author descr the atmospheric temperature and wind conditions associated with the penetration of a cyc with a marked warm sector into the South Pole region coming not from the Ross Sea but f the Palmer Peninsula and the passage of a typical warm and cold front over Amundsen Sta Also wind conditions in the stratosphere over Little America at the end of the period and phenomenon of "mirror fronts" in the troposphere and stratosphere are discussed. *Su Headings:* **1. Antarctic fronts 2. Mirror fronts 3. Amundsen Station, Antarctica.**—*I.L.*

12.11–228 551.515.13(5–011)

Weickmann, L. (*ICAO-TA-Mission, Teheran*), **Häufigkeitsverteilung und Zugbahnen on Depressionen im Mittleren Osten.** [Frequency distribution of paths of depressions in he Middle East.] *Meteorologische Rundschau*, Berlin, 13(2):28–33, March/April **1960.** figs., table, 9 refs. English summary p. 33.—The regional frequency distribution of Lows, nd their principal tracks in the Middle East, particularly over Iran, is investigated on the asis of new meteorological data. The distribution of Lows is strongly influenced by the errain and the season. Their tracks are markedly concentrated in some regions. However, nly two areas appear to enforce a significant deviation of the tracks; the Caucasian Mountains nd the western Himalayas. A closer description is given for the six principal tracks over Iran. *ubject Headings:* **1. Depression tracks 2. Iran 3. Middle East.**—*Author's abstract.*

12.11–229 550.342:551.515.1

Santô, Tetsuo A., **On the origin of microseisms, Pt. 3, The observation of microseisms t a wave gauge station.** *Tokyo. Univ. Earthquake Research Institute, Bulletin*, 38(2):241–54, June **1960.** 10 figs., 8 refs., 3 eqs. Japanese summary p. 253–254. (For Pt. 1, *see arthq. Res. Inst., Bull.*, 37:307, **1959**; for Pt. 2, *see Earthq. Res. Inst., Bull.*, 37:483, **1959.** WB—The article discusses the fact of microseisms becoming heavier after the passing of a clonic center offshore. A new relation is determined between the cyclonic center, its travelg speed and its central pressure. The microseismic observations made at a gage station ggest that the energy of swells changes into microseismic waves at some steep coast. In pan the microseismic amplitudes seem to be influenced by the swells near the station. The sence of second harmonics in period spectrum of swells gives rise to the standing wave cording to theory. *Subject Headings:* **1. Microseisms associated with swell 2. Cyclone ffects on microseisms.**—*A.H.K.*

12.11–230 551.515.13:551.43

Dubov, A. S., **O vliianii gornykh khrebtov na peremeshchenie tsiklonov.** [Influence of ountain ridges on the movement of cyclones.] *Leningrad. Glavnaia Geofizicheskaia bservatoriia, Trudy*, No. 76:40–49, **1958.** fig., 13 refs., 41 eqs. **DWB**—In this theoretical udy of the influence of mountains upon the evolution of cyclones, the author proceeds from e equations of M. I. Iudin for the characteristics of the pressure field expressing the rate of splacement of pressure centers, namely

$$C_x = l^2 \frac{u' \frac{\partial^2\phi}{\partial y^2} - v' \frac{\partial^2\phi}{\partial x \partial y}}{\frac{\partial^2\phi}{\partial x^2}\frac{\partial^2\phi}{\partial y^2} - \left(\frac{\partial^2\phi}{\partial x \partial y}\right)^2} \qquad C_y = l^2 \frac{v' \frac{\partial^2\phi}{\partial x^2} - u' \frac{\partial^2\phi}{\partial x \partial y}}{\frac{\partial^2\phi \partial^2}{\partial x^2}\frac{\phi}{\partial y^2} - \left(\frac{\partial^2\phi}{\partial x \partial y}\right)^2}$$

here C_x and C_y = representations of the velocity of the baric center upon the x and y axis, spectively; u' and v' = deviation of the wind from the geostrophic and baric center; ϕ = geotential of an isobaric surface on which the given center is investigated. Equations are rived showing that the pressure centers move in a field of dissected relief of sufficiently ge scale in the same manner as air particles move in a field of an isobaric surface when ostrophic conditions are fulfilled. The role of isohypses of the isobaric surface is played in s case by isohypses of the relief of the locality. To the extent that mountain ridges are alogous to anticyclones, pressure centers strive to go around them in a clockwise direction. casionally pressure centers intersect mountain ridges. Hence the expression

$$C''_x = -al^2 \frac{\partial H_m}{\partial y} \qquad C''_y = l^2 \frac{\partial H_m}{\partial x}$$

H_m = height of mountain, l = Coriolis parameter) adequately yields that part of the velocity mponent of a cyclone which is influenced by mountains. *Subject Headings:* **1. Cyclone imation 2. Orographic influences on cyclone movement.**—*I.L.D.*

12.11–231 551.515.13

Il'in, G. P., **O skorosti peremeshcheniia tsiklonov.** [On the velocity of cyclone displacement.] *Meteorologiia i Gidrologiia*, Moscow, No. 8:33–34, Aug. **1960.** 2 figs. **DWB,**

DLC—A study has been made of the diurnal variation of the speed of motion of cyclone cente and of their intensities using synoptic charts for the periods 1951 to 1956 and August 1957 March 1958. Both these parameters show a semi-diurnal variation with maxima at 04–05 and 12–15 hr and minima at 07–09 hr and 17–18 hr. A study of the maximum and minimu speeds of motion of the cyclones was also undertaken. The semi-diurnal form of the cu was again evident. *Subject Headings:* **1. Cyclone movement 2. Diurnal cyclone spe variations.**—*R.B.*

12.11–232 551.515.2(7

Butson, Keith; Hardy, Albert V. and McGuire, James K., **Hurricane Donna in Flori North Carolina, and in the Northeast.** *Weatherwise*, Boston, 13(5):210–217, Oct. **1960.** fi photos. **DWB**—Hurricane "Donna" was first detected in the tropical North Atlantic Sept. 2, 1960. After travelling more than 2000 mi it struck Florida on the night of Sept. 9– Tides in the Everglades City-Naples-Fort Myers Beach area were 4–7 ft above normal. G of 135–150 mi hr were recorded on the Middle Keys. Some areas recorded 5–10 in. of rain This was one of the most destructive hurricanes ever to strike Florida from the standpoin property damage. Hurricane "Donna" also caused considerable damage in North Caro and along the Northeast coast. The outstanding characteristic of "Donna" during its pass over North Carolina was the uncommonly large size of the eye. The central area of calm variable winds was estimated at 50 to 80 mi in diameter. Periods of lull were reported f various points in the vicinity of the storm path and wind of less than 15 knots were repo simultaneously from widely separated places. Reports of lowest sea level pressure v received from more than a dozen locations along or near the path of the storm center. hurricane did considerable damage to crops and forests and eight deaths were attributed t The Middle Atlantic and New England States were mainly struck by "Donna's" left h semi-circle, usually the less dangerous one. However, peak gusts along the Maryland, D ware and New Jersey coasts were in the vicinity of 100 m.p.h. and Block Island, R. I. repo a peak gust of 130 m.p.h. In New England the diameter of the eye of the storm was upw of 50 mi *Subject Headings:* **1. Hurricane "Donna" (1960) 2. Hurricane intens 3. Florida 4. North Carolina 5. Northeast United States.**—*A.H.K.*

12.11–233 551.5

Uwai, K., **A supplementary note on the development of tropical disturbance (on at pheric disturbance in low latitudes, Pt. 6).** *Journal of Meteorological Research*, Tokyo, 1 314–321, May **1960.** fig., table, 3 refs., 50 eqs. In Japanese; English summary p. **DWB, DLC**—In this paper, the author discussed the horizontal and vertical motions of fluid layers and compared the result with that of upper air analysis in low latitude. The r obtained is summarized as follows. Increase of upward vertical velocity with time bec large when the upper disturbance has the initial wind speed distribution of type $r^{-n}(n$ and the lower disturbance of type $r^{-n}(n>1)$, where r is the distance from the center o turbance. Then, as the warm trough in upper troposphere has a small magnitude of the speed gradient, a tropical storm in the immature stage under the warm trough seems to de more than a storm under the upper cold trough with a larger wind speed gradient. agrees well with the result of 200 mb analysis. *Subject Headings:* **1. Tropical disturb 2. Low latitude atmospheric disturbances 3. Tropical storm formation.**—*Author's abstra*

12.11–234 551.515.21:551

Jordan, Elizabeth S., **[Comments on] Richard L. Pfeffer: Concerning the mechan hurricanes and [Reply by] Pfeffer.** *Journal of Meteorology*, Boston, 16(5):593–594, **1959.** 3 refs. **DWB, DLC**—In commenting upon RICHARD L. PFEFFER'S paper *Met.*, 15:113–120, **1958**; *see* 9.11–194, Nov. 1958, *Met. Abs.*), the author states that P "shows inflow into the hurricane throughout a large portion of the troposphere with an o in the upper troposphere not very great enough to compensate for the lower inflow." inflow shown in the middle troposphere is based upon computations of E. JORDAN, but computations were not regarded as reliable since radial flow was not presented for these In his reply, PFEFFER points out that all observed wind data give erroneous *net* mass into columns which extend through most of the depth of the atmosphere and denies th variance of the values of the individual values making up the mean radial flow in the

roposphere is greater than the variance making up the mean radial flow at high and low levels. *Subject Heading:* **1. Hurricane dynamics.**—*I.L.D.*

12.11–235 551.515.3(756)

Dinwiddie, Frank B. (*W. B. Cooperative Hurricane Reporting Observer, Nags Head, N. C.*), **Tornadoes near Nags Head, N. C. July 1959.** *Monthly Weather Review*, Wash., D. C., 87(9): 346–350, Sept. 1959. 17 figs. **DWB, DLC**—The paper mentions four tornado occurrences in the area in the month of July of which only two could be fully observed. The first of these occurred on July 10, 1959. The occasion presented an unusual instance of a horizontal roll cloud becoming a tornado. The process of tornado formation and its movement are traced and graphically represented. Surface conditions and the tornado damage are also reported. The second tornado occurrence is reported on July 25, when a large tornado waterspout was observed near Colington Island. A photograph of funnel and several sketches depicting tornado formation are included. *Subject Headings:* **1. Tornado formation 2. Tornado occurrences 3. Nags Head, N. C.**—*I.S.*

12.11–236 551.515.3(47)

Zamorskiĭ, A. D., **Smerchi.** [Tornadoes.] *Priroda*, Moscow, No. 12:65–67, Dec. 1960. 3 figs. **DLC**—General characteristics of three tornadoes observed in the Black Sea region, the Minsk Region and near Leningrad, are briefly outlined without references to meteorological conditions preceding the formation of these disturbances. *Subject Headings:* **1. Tornadoes 2. European U.S.S.R.**—*N.P.S.*

12.11–237 551.515.31:551.594.221

Vonnegut, B.: Moore, C. B. and Harris, C. K., **Stabilization of a high-voltage discharge by a vortex.** *Journal of Meteorology*, Boston, 17(4):468–471, Aug. 1960. 5 figs., 5 refs. **DWB, DLC**—Simple laboratory experiments reported here were carried out to determine what effects, if any, a vortex has on a continuous high voltage discharge. We have found that the vortex produces a stabilization effect similar to that reported by SCHONHERR (1909) on the arc fixation of nitrogen and that it modifies the character of the discharge and the radio frequency noise that it produces. The effects the vortex produces on the discharge can be explained in terms of the centrifugal forces that it exerts. The rotation of the air in the tube produces a radial pressure gradient which is zero at the axis and which increases with the distance away from it. In a pressure gradient such as this, buoyant forces cause the hot gas in the electric discharge to move toward the region of lowest pressure at the axis. Thus the centrifugal action automatically confines the discharge to the center of the vortex. This action stabilizes the discharge by forcing the hot ionized gases together in the axis and by preventing them from moving about and mixing with the cool surrounding air. The results do suggest that at the tornado funnel might serve as a preferred path for lightning and that the vortex may stabilize and modify lightning discharges. *Subject Headings:* **1. Vortex effects on high voltage discharges 2. Tornado funnels.**—*E.Z.S.*

RADIATION (551.521)

See also: Sec. on **Radiation Instruments,** Items 12.11–167 to 12.11–175; **USDA radiological training manual,** 12.11–45; **Long wave radiation balance, Arctic** (Marshunova), 12.11–49; **Radiation balance of snow surface, Antarctic** (Rusin), 12.11–59; **Rocket obs. of solar ultrav. spectrum** (Tousey), 12.11–79; **Light and pasture growth** (Davidson, Philip), 12.11–89; **Light intensity and plant growth** (Black), 12.11–90; **Hydromag. pulsations in Sun-Earth Atmos.** (Paghis et al.), 12.11–107; **Thermal-transducer-type net radiometer** (Fritschen), 12.11–167; **Solar ultrav. radiation in pressure of ozone** (Sekera, Dave), 12.11–202; **Heat balance of soil beneath crops** (Monteith), 12.11–262; **Temp. distr. of snow with gamma ray radiation** (Tien), 12.11–356; **Climatic var. last 1000 yrs. and geophys. causes** (Flohn), 12.11–374; **Radiation intercepted by trees in orchards, Netherlands** (Ferguson), 12.11–377; **Mie scattering in forward area** (Penndorf), 12.11–391.

12.11–238 551.521:551.578.462

Ito, N., **On the relationship between the radiation energy and the melting of snow.** *Journal of Meteorological Research*, Tokyo, 12(6):357–361, June 1960. 5 figs., table, 7 refs.,

11 eqs. In Japanese; English summary p. 357. **DWB, DLC**—The author made seve experiments on the melting of snow relating to the snow survey for the upper stream ba of the Tone in the early spring 1956 and 1957. The results show that the thermal source the melting of snow is mainly solar radiation and the sensible heat transferred by turbul diffusion. The total radiation of sun and sky on a horizontal surface can be measured eas and the outgoing radiation from the snow surface can be calculated by the theoretical experimental formulas. When the cloudiness is not zero, the outgoing radiation depe on cloud conditions, i.e., cloudiness and cloud height. ÅNGSTRÖM and PHILIPPS suggested experimental formulas representing that relationship.' The author reports on the relations he found between the daily insolation and the daily mean cloudiness. Thus, on the avera the insolation and the outgoing radiation are determined by the daily mean cloudiness. suming the albedo of 70%, the estimation diagram of net radiation absorbed by snow surf was shown (Fig. 4). On the diagram, it shows the maximum where the mean cloudines 7–9. *Subject Headings:* **1. Radiation energy 2. Snow surface radiation 3. Snow mel** *Author's abstract.*

12.11–239 551.521

*†Savikovskiĭ, I. A., **Priamaia i rasseiannaia solnechnaia radiatsiia v Minske.** [Di and diffuse solar radiation in Minsk.] *Minsk. Gidrometeorologicheskaia Observato Sbornik Rabot*, No. 2:28–47, **1959.** 4 figs., 15 tables, 21 refs., eq. **DWB**—The result measurements of direct and scattered radiation of the Minsk Hydrometeorological Sta for the period 1936–1937 and 1948–1956 are summarized. The paper contains the follow a description of the place of observation, of the apparatus, of the method and of the observa data used; a discussion with the aid of data (presented in tables and graphs) of the pos incoming direct solar radiation, actual incoming direct solar radiation, scattered radiation total radiation. Data are presented on the mean intensity of direct radiation upon a horizo surface at the mean solar time; the mean intensity, S_0, of direct solar radiation on a horizo surface at different solar altitudes at every hour, the possible total $\Sigma S'_0$, monthly tota direct solar radiation upon a horizontal surface, mean hourly totals of direct radiation up horizontal surface, monthly totals of scattered radiation for individual years, monthly sur total radiation etc. *Subject Headings:* **1. Solar radiation measurement 2. Direct and di radiation 3. Minsk, Minsk Region, U.S.S.R.**—*I.L.D.*

12.11–240 551.521.1

*de Boer, H. J., **A calculation of global radiation in the Netherlands with the aid o relative duration of sunshine.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Se* Vienna, 10(4):537–546, **1961.** 4 tables, 4 refs., 10 eqs. English, German and French maries p. 537–538. **DLC** –A ÅNGSTRÖM has assumed a linear relation between daily of the global radiation measured at a certain place and the corresponding daily values o relative duration of sunshine. Other authors have applied the same relationship, how with a different unit of time, such as a 5-day period, a 10-day period and a month. In paper a period of one hour is chosen as unit. ÅNGSTRÖM's Q_0- and x-values have been d mined for De Bilt and for the one-hour periods L. A. T. of the mean day in each of t months of the 5 year period 1954–1958. For the mean day of each of the 12 months d year the arithmetic means of the 5 Q_0- and 5 x-values for the same hours have been calcul A simple method to compute daily amounts of global radiation by means of these averag and x-values has been applied to De Bilt and Wageningen for all days of 1958. The s root of the residual variance of the thus determined daily amounts appeared to amou 0.75 for De Bilt and to 0.82 for Wageningen compared with that computed for Wage from ÅNGSTROM's formula for daily amounts directly. This result shows that the av hourly Q_0- and values for De Bilt may be used to calculate daily amounts of global rad for any place in the Netherlands. *Subject Headings:* **1. Global radiation amounts 2. Sun duration 3. Netherlands.**—*Author's abstract.*

12.11–241 551.521.1:551.5

Lebedeva, I. M. and Minaeva, E. N., **Issledovanie proniknoveniia solnechnoĭ ra v snezhnyĭ pokrov v sviazi s parnikovym effektom pri snegotaianii.** [Study of the penet

of solar radiation into snow cover in connection with hothouse effect during snow melt.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geog.*, No. 5:60 64, May **1960.** 2 figs., table, 3 refs. **DWB**—This study on the hothouse effect of penetrating radiation during snow melt was carried out during the spring of 1955 and 1956 in southern trans-Volga near the town of Ershov. Observations were made on total and reflected solar radiation and short wave radiation within a snow cover, on atmospheric temperature, cloud cover and wind direction and velocity. The weather conditions during the period of observation are summarized. The distribution of solar radiation within the snow cover is discussed with the aid of data presented in tables and graphs. It is shown that the phenomenon of hothouse effect may play a fundamental role in snow melt when the snow cover is not deep and the weather is sunny. *Subject Headings:* **1. Solar radiation effects on snow melt 2. Hot house effects on snow melt 3. Trans-Volga, European U.S.S.R.**—*I.L.D.*

12.11–242 551.521.1/3

*Mongelli, F., **Radiazione solare diretta sopra una superficie orizzontale.** [Direct solar radiation on a horizontal surface.] *Bollettino di Geofisica, Teorica e Applicata*, Trieste, 2(8):631–640, Dec. **1960.** 5 figs., 4 tables, 3 refs., 2 eqs. In Italian; Italian and English summaries p. 631.—The results of observations of sunshine—total, diffuse and direct—on a horizontal surface and solar radiation, relative to clear days only, made from July 1, 1958 to June 20, 1960 are given. The envelope T_0 of highest values of total radiation is derived: this is compared with theoretical value for transparency coefficient $p=0.7$ and $p=0.8$. For representation by empirical formulas of solar direct radiation on a horizontal surface, integral relationship to be applied to each day is proposed. *Subject Headings:* **1. Solar radiation measurements 2. Direct and diffuse radiation.**—*Author's abstract.*

12.11–243 551.521.1:551.506.3(497.1)

*Penzar, Ivo, **Globalna radijacija u Zagrebu na temelju 10-godišnjega mjerenja.** [Global radiation at Zagreb on the basis of 10 years of observations.] *Zagreb. Sveučilište. Geofizički Institut, Radovi* (Papers), Ser. 3, No. 12, **1959.** 31 p. 4 figs., numerous tables, 12 refs., 1 eqs. German summary p. 27–31. **DWB, DLC**—The actinograph registrations of global radiation of Grič Observatory at Zagreb for 1949–1958 are analyzed. Securing the homogeneity of registrations, the tables present the monthly amounts with an average of 8.5 kg cal m^{-2}, their maxima and minima and intersequent variability, comparing them with some foreign results; the daily mean values with an average of 279 ly showing a difference from 490 to 700 cal. cm^{-2}, the values of daily sums on clear and cloudy days; the relative radiation of Zagreb and some other stations; the loss of global radiation passing through the atmosphere computed by various means; the relation of radiation to various scales of cloudiness and to clear skies and, finally, the daily course of radiation expressed in lys in two hour intervals showing a symmetrical distribution around noon. The yearly course of the mean monthly amounts is also illustrated. *Subject Headings:* **1. Global radiation data 2. Zagreb, Yugoslavia.** —*O.T.*

12.11–244 551.501.721:551.521.1(083.3)

*Schüepp, W. (*Service Météorologique du Congo Belge, Bureau du Rayonnement, Léopoldville*), **La conversion du rayonnement sphérique en rayonnement global.** [The conversion of spherical radiation to global radiation.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, Vienna, 10(3):311–341, **1960.** 8 figs., 8 tables, 10 refs., 61 eqs. French, German and English summaries p. 311–312. **DWB, DLC**—The daily totals of radiation falling on a horizontal receiver as well as on a spherical one are calculated by theoretical approach. Both types of values change very much with atmospheric conditions, such as pure atmosphere, haze and humidity of the atmosphere and cloudiness and also with the geographical latitude, the declination of sun and, finally, with the albedo of the ground. It is demonstrated that it is nevertheless possible to establish a relation of second or third order between both these types of values. The coefficients are function only of $|\varphi-\delta|$, the difference between latitude and declination and of the albedo α. This relation is valid in low latitudes $\varphi<30°$ for daily totals; in higher latitudes its validity is limited to days of the summer period. *Subject Heading:* **1. Global radiation calculation.**—*Author's abstract.*

12.11–245 551.521.1

Prokh, L. Z., **K voprosu o prozrachnosti atmosfery v Kieve.** [On the problem of a mospheric transparency in Kiev.] *Meteorologiia i Gidrologiia*, Moscow, No. 12:22–23, De **1960.** 2 figs., table. **DWB, DLC**—On May 6, 1957 six actinometric stations were set up different points in Kiev to investigate the variations in the incoming solar radiation. T day was clear and calm until evening. The results show a much higher value for the stati at Bagrinov Mountain to the south of the town than for any of the other stations. On M 11, 1957, 7 stations were set up around a cement works south of Kiev. The most mark result was the obvious effect of an area of vegetation as an efficient dust collector. *Subj Headings:* **1. Solar radiation variations 2. Dust pollution 3. Kiev, Ukrainian S.S.R.**—*R.B*

12.11–246 551.501.721:551.521.

Malkevich, M. S., **Priblizhennyĭ metod ucheta gorizontal'nykh izmeneniĭ al'bedo po stilaiushcheĭ poverkhnosti v zadachakh o rasseianii sveta v atmosfere.** [Approximate meth of accounting for the horizontal changes of the albedo of the underlying surface in proble of light scattering in the atmosphere.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, N 2:288–298, Feb. **1960.** 4 figs., table, 3 refs., 34 eqs. **DLC**—The horizontal variation of underlying surface influences slightly the corresponding variation in the intensity and flux downward scattering radiation. Hence it is possible to assume in actual calculations t values are as a first approximation constant along the horizontal coordinate axes and to obt these values with the aid of a unidimensional theory of scattering for any average albedo (in the case of an exponential variation of albedo) for any value at every interval of const albedo. This condition excluding nonlinearity in limiting conditions at the underlying surf provides a simplified method for calculating the horizontal variation of albedo $q(\xi)$, (ξ = n dimensional horizontal coordinate) and further its application to a wider class of functi $q(\xi)$. The derivation of equations for determining $\bar{I}^{-1}(\tau, \xi; \theta, \psi)$ and $k(\tau, \xi)$ where former is the intensity of ascending radiation and the latter is radiation flux (τ = optical thi ness of a column of air of height z, ψ = azimuth, θ = zenith angle of rays) is presented. instances of such variations of albedo are examined where the function $q(\xi)$ is represented as expansion, namely:

$$q(\xi) = e^{-\epsilon|\xi|} \sum_{k=0}^{\infty} [q_k \cos k\xi + p_k \sin k\xi]$$

The proposed method for calculating the horizontal variation of albedo is applied to condition when $q(\xi)$ is a power function and an example of the scattering of radiation by atmosphere on two differently reflecting surfaces having boundaries sufficiently distant f the line of separation (dry land-sea) is examined. The application of the method to the where the albedo is a function of two variables is outlined. *Subject Headings:* **1. Alb variations 2. Light scattering.**—*I.L.D.*

12.11–247 551.521.16:551.593.55:551.521

Barteneva, O. D. and Boiarova, A. N., **Iarkost' sumerechnogo i nochnogo neba.** [Bri ness of twilight and of the night sky.] *Leningrad. Glavnaia Geofizicheskaia Observato Trudy*, No. 100:133–140, **1960.** 2 figs., 2 tables, 6 refs. **DWB**—In solving problems rel to the visibility of faroff objects and lights in darkness, it is frequently necessary to have data on distribution of brightness in the sky at twilight and at night, as well as its rela to the depth of sun under the horizon. Due to the fact that there have been only a few stu on this subject and these did cover all the cases that are met in actuality, the present ar is dedicated to the investigation of distribution of brightness at twilight and at night a different negative altitudes of the sun. The description is given of the various appa used, their precision and additions to existing instruments to increase their capacity. vestigations are carried on by various methods of observations. Description of observa are given with great detail and accompanied with graphs and tables for cloudy and clou skies, with sun at different negative altitudes. Comparison of results obtained by the au with those of others indicate that they were of the same order. However, the results obt recently by BULLRICH in Germany indicated much less brightness for cloudless as w

cloudy skies. It was 3 to 5 times less than that found by the authors. Differences in results of the two investigations may be due to different conditions under which the observations were made. All investigations are referred to the moonless nights, or nights on which the effect of moonlight was negligible. *Subject Headings:* **1. Twilight sky brightness 2. Night sky brightness 3. Visibility.**—*B.J.G.*

12.11–248 551.521.18:551.510.528

Darkow, G. L., **Infrared radiation measurements near the tropopause.** (In: Wisconsin. Univ. Dept. of Meteorology Contract Cwb-9757, Annual Report, June **1960.** p. 19–27. figs., 11 refs.) **DWB** (M(051) W811in)—Studies in infrared radiation measurements near the tropopause (University of Wisconsin, June 1960), suggest that the observed variability in time and space of infrared radiation flux gradients in the upper troposphere and lower stratosphere precludes any simple generalizations as to the gross effect of infrared radiative cooling at these heights. Infrared radiation may indirectly contribute to the intensification of a tropopause level by increasing the instability of the upper troposphere and/or by increasing the stability of the lower stratosphere. The role of cirrus clouds and haze layers in this respect may not be dismissed until more observations are made of their contribution as a wide spread vertical discontinuity in radiative components. Infrared radiation contributes to the destruction of the tropopause in many situations, presumably those with a continuity of absorber concentrations through the tropopause. Synoptic observation of vertical gradients of infrared radiation in the upper troposphere and lower stratosphere may not only contribute to our understanding of the rapid development of upper air lows but might possibly serve as a simple means of forecasting their development. *Subject Headings:* **1. Infrared radiation measurements 2. Upper air lows.**—*E.S.*

12.11–249 551.521.18:551.501.721

Gaevskiĭ, V. L., **Issledovanie dlinnovolnovogo izlucheniia atmosfery.** [Investigation of long wave radiation of the atmosphere.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy,* No. 100:86–92, **1960.** 3 figs., 2 tables, 7 refs., 4 eqs. Russian summary p. 86. **DWB**—Describes the methods used for measurement of long wave radiation of the atmosphere in daytime and at night. The results of observations on the ground and in an airplane are given and the comparisons made with the data obtained analytically. The direct measurement of atmospheric back radiation and terrestrial radiation is a very complicated problem due to the elimination of the effects of wind and the changes in air temperature from the instrumental readings; distinguishing the spectrum of long wave radiation in daytime observation is another difficulty. The methods offered recently by various authors were either too complicated or could not eliminate the influence of the aforesaid factors. Therefore, the author offers his simpler method using an instrument of the type of one used by STERN and SCHWARTZMAN. This instrument is described in detail with the mathematical basis cited. The error of the instrument is analyzed and evaluated. The data obtained on a windless night with the author's instrument and with an Ångström pyrgeometer were compared and showed good agreement. This comparison is shown in a table. The daily rate of atmospheric back radiation investigated; the graphs of it and for terrestrial radiation are shown. The measurements of long wave radiation made in an airplane are described. *Subject Headings:* **1. Long wave radiation measurement techniques 2. Terrestrial radiation.**—*B.J.G.*

12.11–250 551.521.3:551.576.1

Prokh, L. Z., **Oslablenie summarnoĭ radiatsii oblakami.** [Attenuation of total radiation by clouds.] *Kiev, Ukraine. Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy,* no. 10:15–24, **1959.** 5 figs., 3 tables, chart, ref. **DWB, DLC**—The methods and results of a study of such an attenuation made possible by the comparison of cloud thickness evaluated by observations from aircraft and at the aircraft sounding point with pyranograph and heliograph recording on clear and cloudy (with and without rain) days are presented. It has been found that in the presence of 700 m, 300 m and 200 m thick cumulus clouds only 20, 35, and 50 percent, respectively of solar radiation reaches the earth's surface. The relationship between the penetration of radiation through clouds of various thickness and the sun's height

was also investigated. *Subject Headings:* **1. Radiation attenuation by clouds 2. Cloud effe on global radiation.**—*A.M.P.*

TEMPERATURE (551.524)

See also: **Body reaction to microclimate** (Mirchev), 12.11–95; **Local temp. extrapolation** (Henson), 12.11–154; **Late and early frost, Alps** (Lauscher), 12.11–159; **Temp. meas. in aerolog. instruments . . . inversion layer invest.** (Pakhomov), 12.11–173; **Air temp. and humidity gradients meas. by psychrometers** (Konstantinov, Golubev), 12.11–182; **Short range forecasting** (Kibel', Sadokov), 12.11–183; **Climatic control of land utilization** (Mason), 12.11–186; **Seasonal patterns of general circulation** (Pogosian), 12.11–224; **Heat transfer from ground to air** (Priestley), 12.11–263; **Nocturnal density currents** (Brooks, Schultz), 12.11–279; **Velocity and temp. distr. on horiz. flat plate in uniform stream** (Kano et al.), 12.11–290; **Wind and temp. fields of upper tropos. and lower stratos.** (Chiu), 12.11–301; **Fog clearance following cloud sheet** (Saunders), 12.11–325; **Temp. distr. of snow with gamma ray radiation** (Tien), 12.11–356; **Canadian Arctic temps.** (Thomas), 12.11–371; **Variations in European climatic temp.** (Portig, Fay), 12.11–375.

12.11–251 519.2:551.52

Craddok, J. M. and Grimmer, M. (*both, Met. Off., Dunstable*), **The estimation of m annual temperature from the temperatures of the preceding years.** *Weather*, London, 15(1 340–348, Oct. 1960. 3 figs., 2 tables, 12 eqs. **DLC**—Temperature records for 79 stati with a long run of records in various parts of the world have been analyzed in an attemp evaluate the best method of estimating the mean annual temperature. The arithmetic me given by $X_n = \frac{1}{k}(x_{n-1}+x_{n-2}+\cdots x_{n-k})$ and the value x_n given by exponential smoothing the expression $X_n=(1-r)(x_{n-1}+rx_{n-2}+r^2x_{n-3}+\cdots)$ have been computed for values o from 1, 2 up to $K=5$ of $K=N-15$, whichever was less, and for values of r from 0.50 to in steps of 0.01. The residual variances of each of the estimates have also been compu The computations were carried out on an electronic computer. The arithmetic mean found to be the more satisfactory. It is concluded that for stations with homogeneous rec an average over a period of between 10 and 30 years would give the best estimate. If records are not homogeneous then a shorter period is preferred. *Subject Headings:* **1. Stati 2. Mean annual temperature estimation.**—*R.B.*

12.11–252 551.524.3:551.513.2(47

*Kvaratskheliia, I. F., **Ob osobennostiakh temperaturnogo rezhima i mestnoĭ tsirkuli atmosfery nad Sukhumi.** [Characteristics of the temperature regime and local atmosp circulation over Sukhumi.] *Tiflis. Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Ins Trudy*, No. 4:93–111, **1959.** 6 figs., 12 tables, 6 refs. **DWB**—Using radiosonde observat for Sukhumi for the period 1947–1953, the author investigated the atmospheric tempera regime. The local atmospheric circulation was examined with the aid of summer observat for the period 1951–1954. The discussion includes the following: variation of tempera with altitude, mean thickness and intensity of temperature inversions and isotherms; variation of temperature over Sukhumi; local atmospheric circulation over Sukhumi, daily variation of wind velocity. Data are presented on mean monthly atmospheric perature at different altitudes, amplitude of annual temperature fluctuations, tempera differences of adjacent months, frequency (%) of heights of the lower boundaries of inver and isotherms and of days with inversions and isotherms, temperature distribution by sea frequency of wind direction in summer, at night and by day, etc. *Subject Headings:* **1. perature regime 2. Local atmospheric circulation 3. Monthly mean temperature 3. Sukhumi, Abkhazian A.S.S.R.**—*I.L.D.*

12.11–253 551.524.32:551.5

*†Nakada, Yoshio (*Niigata Local Met. Obs.*), **Analytical study on the variation of mo mean surface air temperature.** *Geophysical Magazine*, Tokyo, 30(2):231–286, Dec. 15 figs., 11 tables, bibliog. p. 284–286, eqs. **DWB, DLC**—The variation of monthly

emperature has been studied analytically. In the first place, it was shown that the ordinary nnual march of temperature consists of four components, two static components and two ynamic components with normal temperature; their physical meanings are considered, nvestigating the distribution of components over the Far East Asia. As an inevitable con- equence, the phenomenon of "singularity" was taken up. In the second place, the variation f abnormality has been investigated and separated into six systems, with the result that four f those components were nothing but the deformation of ordinary annual variation systems btained in the first step. S- and L-systems, investigated in the previous paper, were taken p again and confirmed. The origin of abnormality in temperature variation was clearly und and the course of research for seasonal forecast was established. From the facts ob- ined here, a new idea on general circulation of the atmosphere is suggested. *Subject Head- gs:* **1. Mean monthly temperature variations 2. Singularities 3. Seasonal forecasting General circulation.**—*Author's abstract.*

12.11–254 551.524.3(521.84)

Yoshimochi, A., **10-day mean temperature at Hiroshima.** *Journal of Meteorological esearch*, Tokyo, 11(8):720–722, Aug. **1959.** fig., table, 4 refs. In Japanese. **DWB, DLC**— he author has arranged "60 years reports in Hiroshima (1889–1950)" and 15 years of weather onthly for the calculation of 10-day mean temperatures, frequency distribution of 10-day ean temperature and standard deviation. Then, the above problems were briefly explained connection with the method for drawing a graph and its related matters such as a normal istribution, an air mass and season, and a normalization of long year distribution of 10-day ean temperature in Hiroshima. *Subject Headings:* **1. 10-day mean temperatures 2. Mean mperature data 3. Hiroshima, Japan.**—*K.C.*

12.11–255 551.524.31:551.510.522(472)

Gandin, L. S.; Piatygina, K. V.; Onikul, R. I.; Titov, V. M. and Shafran, Z. M., **O sutoch- m khode temperatury v nizhnikh sloiakh atmosfery.** [Diurnal temperature variation in the wer layers of the atmosphere.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, o. 76:3–29, **1958.** 9 figs., 4 tables, 10 refs., 27 eqs. **DWB**—The authors discuss the theory d method of M. E. SHVETS for forecasting the diurnal variations of temperature and the cent modifications introduced by BERLIAND into the computational procedure, and present more precise and simple formulation of the formulas and theory for calculating the daily mperature variation. This involves the use of the hypothesis of a quasistationary layer ar the ground, grouping data according to the values of the parameters determining the urse of daily temperature (advection and transformation of air masses), averaging within ch of such groups and computing diurnal air temperature variations at different levels and mparing with actual air temperature, soil temperature and heat flux in the atmosphere and il. The theory of diurnal variations of temperature is considered as a theory of periodic nsformation of temperature and humidity fields in stationary air and soil temperature as a nsequence of the daily variation of total short wave radiation arriving at the underlying rface. The derivation of equations for calculating variations of daily air temperature, ecific humidity and soil temperature and their relation for harmonics of temperature at the derlying surface, at the upper level of layer near the ground, at the atmospheric level above e upper level and for harmonic temperatures of the soil are presented. The parameters tering into the formula, such as the temperature of the underlying surface, the thermal aracteristics of the soil, etc., are analyzed. The computation of diurnal temperature riation is illustrated with the aid of examples. The verification of the calculated values is ried out with the aid of actual field observations and a detailed analysis of daily temperature riations for Leningrad is presented. *Subject Headings:* **1. Diurnal temperature variations Leningrad, U.S.S.R.**—*I.L.D.*

12.11–256 551.524.32(4)

Berkes, Z. (*Budapest*), **Der Verlauf der jährlichen Erwärmung und Abkühlung im Klima uropas.** [Annual warming and cooling in the climate of Europe.] *Archiv für Meteorologie, ophysik und Bioclimatologie, Ser. B*, Vienna, 10(4):433–444, **1961.** 6 figs., 2 tables, ref.

German, English and French summaries p. 433–434. **DLC**—Using the "relative temperatu introduced by Köppen, the shape of the annual variations of temperature in Europe is vestigated. To do this, the variations from month to month of the 30-year normal values expressed in percents of the annual amplitude. It is found that in Central Europe the warm between January and April proceeds from southwest to northeast, and is most pronounced the Basin of Transylvania (Romania). Relative heating in June has a minimum in the west Ukraine. The center of cooling proceeds from northern Europe towards the southwest. development of warming and cooling centers is determined by insolation, advection, particularly by monsoon effects. *Subject Headings:* **1: Annual temperature variations 2. mate of Europe 3. Europe.**—*Author's abstract.*

12.11–257 551.524.32(410):519.2

*Shellard, H. C., **Averages of accumulated temperature and standard deviation of mont mean temperature over Britain, 1921–50.** *Great Britain. Meteorological Office, Professio Notes*, 8(125), **1959.** 30 p. 15 figs., 11 tables, 3 eqs., 8 refs. **DWB**—Six methods of deriv the averages of accumulated temperatures with respect to any particular base are discus Report gives the relative evaluation of all the methods and the sources of meteorological d It gives the names of the 49 British stations whose averages of accumulated temperatures h been computed. The isopleths give a general picture of the distribution of the average num of degree days below 60°F. These vary from 3000 in the extreme southwest of Englan 6000 and above at levels over 1000 feet in central Scotland. Near the sea level in nort Scotland and the Shetlands, values of 5000 and above are recorded while the Ben Nevisi sum presumably has an annual average of over 10,000 degree-days below 60°F. Separate maps each month during 1921–50 show the standard deviation of monthly mean temperatures the British Isles. *Subject Headings:* **1. Monthly mean temperature data 2. Accumul temperature averages 3. British Isles.**—*N.N.*

12.11–258 551.524.35:551.5

Levert, Christoffel, (*Kgl. Niederländisches Met. Inst., De Bilt*), **Meteorologische statistische Betrachtungen über die interdiurne Veränderlichkeit.** [Meteorological statistical consideration of interdiurnal variability.] *Archiv für Meteorologie, Geophysik Bioklimatologie, Ser. B*, Vienna, 10(3):412–421, **1960.** 2 figs., 2 tables, 5 refs. Ger English and French summaries p. 412–413. **DWB, DLC**—Practical questions as to the i diurnal variations of temperature and humidity forced us to make a thorough study o interdiurnal variability (I.V.). First of all we examined which quantity could represen I.V. best. The I.V. proved to depend on the situation of the station and to possess a h pronounced annual variation. Considerations of reliability required numerical knowled the autocorrelation of the time series of the daily values of temperature and humidity. C cients of autocorrelation of orders 1 up to and including 6 were computed. The time s of the I.V. shows negative autocorrelation. In order to facilitate answering practical prob a nomogram was constructed. A second nomogram makes it possible to estimate, for inst the minimum length of the basic period required in order that the answer found with the of the first nomogram possesses a prescribed reliability. *Subject Headings:* **1. Interdi temperature variations 2. Temperature variations 3. Interdiurnal humidity varia 4. Humidity variations.**—*Author's abstract.*

12.11–259 551.5

Lauscher, F., **Über die alten und neuen Kälte-Rekorde.** [On old and recent reco cold.] *Wetter und Leben*, Vienna, 11(8/10):150, **1959.** **DWB**—The oldest cold record was −68°C but recently −87.4°C was recorded at Vostok on 25 Aug. 1958. Doubtle equilibrium of the warming up period has not been reached. *Subject Headings:* **1. Recor temperatures 2. South Pole temperature extremes 3. Vostok, Antarctica.**—*E.Z.S.*

12.11–260 551.524.36

Robertson, George W. and Holmes, R. M., **Freezing temperature probabilities at O** *Canada. Dept. of Agriculture, Publication*, 1047, Feb. **1959.** 4 p. 2 tables, 2 refs. The problem of freezing temperature is discussed. The tables on frosts are generally bas a temperature of 32°F. A temperature of 20°F is taken as a killing frost. The tabl

based on records of minimum temperature at central experimental stations of Ottawa. Ground frost occurs when standard minimum temperature is several degrees above the freezing point. Minimum temperature at tips of grass is 6 to 8 in. lower than the standard. Tables give the percentage probability of the last and the first freeze in spring and autumn, respectively. *Subject Headings:* **1. Freezing temperature probabilities 2. Frost data 3. Ottawa, Canada.** —*A.H.K.*

12.11–261 551.524.36:631.4

Stelzer, Franz (*Vienna*), **Die Bodenbewegungen im Winter 1959/60.** [Soil movement in the winter of 1959/60.] *Wetter und Leben*, Vienna, 12(5/6):114–118, **1960.** 2 figs., table, 9 refs. German and English summaries p. 114. **DLC**—Erosion and transport of soil during the winter is correlated with frost action. Temp. extremes, precip. and snow cover are related to frost heaving of the soil. Measurements of heaving are correlated with weather elements. *Subject Headings:* **1. Frost heaving effects on soil 2. Frost influences on soil movement.** —*E.Z.S.*

SOIL TEMPERATURE (551.525)

See also: **Vert. and horiz. veg. zones, Tibet** (Wissmann), 12.11–25; **Influence of subpermafrost water and naleds on water balance, n.e. U.S.S.R.** (Kalabin), 12.11–139; **Night cooling at two-inch soil level** (Saunders), 12.11–150; **Atmos. heat balance over soils, Lake Balaton reg.** (Kiss), 12.11–212; **Heat balance of soil beneath crops** (Monteith), 12.11–262.

12.11–262 551.521:551.524.3:551.525:633

Monteith, J. L. (*Rothamsted Exper. Station, Harpenden, Eng.*), **The heat balance of soil beneath crops.** *UNESCO, Arid Zone Research*, 11:123–128, pub. **1958.** 3 figs., table, 13 refs. French summary p. 127. **DWB** (M84 US8cl)—The purpose of this note is to describe how soil heat flux can be measured, to show how it is related to net radiation under British summer conditions, how the relation is affected by the nature of the crop cover and of the soil surface, and to indicate briefly how the relation might depend on season and what it might be in a more extreme climate. The apparatus and installation are described. Results are shown graphically: hourly totals of net radiation and soil heat storage beneath potatoes, wheat and grass; night and day values of ratio of soil heat storage to net radiation and rainfall. *Subject Headings:* **1. Soil heat balance 2. Soil heat flux 3. Energy balance of crops 4. Soil heat storage measurement 5. Heat storage ratio.**—*E.Z.S.*

12.11–263 551.558.1:551.511:551.524:551.525

Priestley, C. H. B. (*Div. of Met. Physics, C. S. I. R. O., Melbourne*), **Sensible heat transfer from ground to air.** *UNESCO, Arid Zone Research*, 11:106–108, pub. **1958.** 8 refs., 7 eqs. French summary p. 108. **DWB** (M84 Us8cl)—Two types of convection regime are explained and formulas for each are derived. The pattern of motion, temperature and the law of heat transfer are different in the forced and in the free regime. After elaborating on the forced regime, the author notes the importance and frequency of the free convection regime, particularly in the arid zone and discusses the pattern of motion and the character of the agents of heat transfer in arid areas. *Subject Headings:* **1. Convection formulas 2. Law of heat transfer 3. Free convection regime 4. Heat flux 5. Forced convection regime 6. Edithvale, Victoria, Australia.**—*E.Z.S.*

12.11–264 551.525(497.1)

Reya, Oskar, **Gibanje temperature v tleh.** [Variation of soil temperature.] *Društvo Meteorologov Slovenije, Meteorološki Zbornik*, 1:92–100, **1957.** 3 figs., 2 tables. English summary p. 99–100. **DWB, DLC**—In the following discussion the temperature movement in the ground is dealt with. In the Hydrometeorological Institution in Ljubljana the ground temperature is observed to a depth of 50 cm for the months of April to October. The ground is bare and consists of diluvial deposit. A table gives the mean values for the 5 year period (1952–1956) and for 7 a.m. and 2 p.m. The values at the ground level (0 cm) are given only for two years (1955–1956). The last three columns give the mean values of the minimum temperature of the air at 5 cm above the ground and the mean minimum and maximum temperature at 2 m above the ground in the instrument shelter. In Fig. 1 the thermoisopleths

for the mean temperature at 7 a.m. are given. It can be seen that the ground is the warme at a depth of 30 cm when the temperature reaches 21°C. Fig. 2 gives the temperature cond tions at 2 p.m. The temperature maximum at the surface in July rises to 35°C; the ter perature is, however, constant at 21°C at a depth of 30 cm. A table (2) gives the absolu temperature values. In July the surface layer warms up to 50°C (49.3°C). At depths und 10 cm the temperature does not rise above 30°C. In the vegetative period the temperatur can still fall below 0°C at the surface—in April to −2°C and in October to −1°C. At dept below 5 cm the temperature does not fall under 0°C. High temperatures are liable to f quickly. If the temperature at the surface is 50°C, the temperature at the depth of half meter barely reaches that of half the surface value—i.e., 23.6°C. Minimum air temperatu at 5 cm above the ground is constantly below the temperature of the earth's surface, both to mean and absolute values. This is evident from both the tables. Also the minimums an altitude of 2 m are lower than those at the Earth's surface, yet they are higher than tho at an altitude of 5 cm. On the contrary, however, the maximums are higher on the grou than those at an altitude of 2 m. Absolute maximum on the ground amounted to 49.3° at an altitude of 2 m, however, only 34.2°C. Fig. 3 gives curves of the temperatures of t ground from April to Oct. At 7 a.m. the curve for the depth of 50 cm is higher than the surfa curve at 2 p.m. as would be expected. *Subject Headings:* **1. Soil temperature variatio 2. Ljubljana, Yugoslavia.**—*Author's abstract.*

12.11–265 551.525:551.57

Sarson, P. B. (*Met. Off., G. Brit.*), **Exceptional sudden changes of Earth temperatu** *Meteorological Magazine*, London, 89(1057):201–209, Aug. **1960.** 5 figs., photo. **DWB, D** —It is considered as axiomatic that Earth temperatures at depths below 2 ft are not subj to sudden changes. However, some such cases do occur in exceptional weather and one or t special occasions are discussed in this paper. The main agent of heat transfer in soil is c duction. Other effects are usually small. The only effect which would enable the transfe temperature changes quickly from one level to another is that of drainage of water. occasion in March 1947 when sudden changes occurred at Hesketh Park, Southport, afte melting of snow cover is discussed in detail. Other occasions when similar changes have b noticed at stations in the British Isles are discussed more briefly. Most of these were sociated with melting snow conditions although one refers to a drop in temperature at the depth following a summer thunderstorm. *Subject Headings:* **1. Soil temperature variati 2. Heat transfer in soil.**—*R.B.*

12.11–266 551.501:551.525

Pletser, János, **A száraz és nedves talaj hőmérséklete.** [Temperature of dry and soil.] *Időjárás*, Budapest, 64(1):48–49, Jan./Feb. **1960.** fig. **DLC**—Experiments w performed at the Agricultural Research Institute of Martonvásár, Sept. 15–16, 1958, compare temperature in irrigated and nonirrigated soil at four different depths to 20 Cloudiness measurements were also made. Temperature differences at the 99.9% significa level were found at all depths between the irrigated and nonirrigated parcels, as illustrated diagrams. *Subject Headings:* **1. Soil temperature-soil moisture relationships 2. Martonvá Hungary.**—*G.T.*

PRESSURE AND WIND (551.54–5)

PRESSURE (551.54)

See also: **Deflection of winds and nonstationary phenomena in atmos.** (Reshetov), 12.11–28; **Dynamical study of 1958–1959 stratos. polar vortex** (Boville), 12.11–47; **Altimeter error meas.** (Gracey et al.), 12.11–77; **T.B. hemoptysis-pressure pattern relationships** (Nemoto et al.), 12.11–94; **Unified network for European levellings** (Tardi), 12.11–116; **Monthly mean 50 mb and 100 mb charts** (Panofsky), 12.11–158; **Atmos. solar tide and semidiurnal heating of lower atmos.** (Sawada), 12.11 269; **Lee waves in atmos.** (Scorer), 12.11–310.

12.11–267 551.511:551.541:551

Donn, William L. (*Brooklyn College and Lamont Geological Obs., Columbia Univ.*), **W in the atmosphere.** *Weatherwise*, Boston, 8(4):98–100, 106, Aug. **1955.** 3 figs. (incl. ph

DWB, DLC—Fairly detailed discussion of atmospheric waves: situations in which they may occur, what they are and how they are detected. Author uses analogy with ocean waves for explanation and description of atmospheric waves. Several graphs and figures illustrate the text. *Subject Heading:* **1. Atmospheric waves.**—*A.J.M.*

12.11–268 551.509.318:551.543:551.515.8(52)

§Rikitake, T., **On the pressure disturbance, Pt. 2.** *Journal of Meteorological Research*, Tokyo, 12(2):71–80, Feb. **1960.** 8 figs., table, ref. In Japanese; English summary p. 71. [**Comment by**] I. Isozaki and [**Reply by**] Rikitake. *Ibid.*, 12(11):844–845, Nov. **1960.** (For abstract on Pt. 1, *see* 12.7–376, *Met. Abs.*) **DWB, DLC**—In this paper the pressure disturbances are investigated which occurred on July 1, 1954. The similar phenomenon was reported by the previous paper (Pt. 1). About 0230 JST July 1, 1954, the pressure disturbance appeared almost on the 136°E longitudinal line and propagated eastward with the speed 70∼100 km/hr. The occurrences and movements were limited to the central and eastern parts of Japan proper, which was covered with an invaded frontal surface. The amount of pressure-fall was, as far as recorded, less than 5 mmHg, and its duration ranged from a few minutes to 1 hour. Further V-shaped pressure variations were recorded on the east side of the mountainous areas. On the southern side of the front, there occurred a disturbance similar to one that was called the "Microbarographic-Elevation Type" by NAMEKAWA and YAMAMOTO when the pressure disturbance propagated eastward on the northern side of the front. At almost all the stations where pressure-falls were clearly recorded, sudden increases of easterly wind velocity occurred simultaneously with the pressure-falls, while at about 30% of all those stations the increase of temperature took place immediately after the pressure-fall. And furthermore, at all the stations, which were located in the rainy districts and had distinct records of pressure-falls, there occurred also sudden drops of precipitation intensity almost simultaneously with the pressure-fall. On the tops of mountains lying under the frontal surface, the records were similar to those of the plain. At the elevated stations above the frontal surface, the amount of pressure-fall was smaller than those at the stations in the plain. The pressure disturbance treated here occurred in the area occupied by the mesoscale trough and situated under the frontal surface which inclined to the zonal direction. *Subject Headings:* **1. Pressure disturbances 2. Synoptic conditions for pressure disturbances 3. Japan.**—*Author's abstract.*

12.11–269 551.51:551.543.1:525.6

Sawada, R. (*Kyusyu Univ., Japan*), **The atmospheric solar tide and the semidiurnal heatings of the lower atmosphere.** *Meteorological Society of Japan, Tokyo, Journal*, Ser. 2, 38(3):154–160, June **1960.** 4 figs., 2 tables, 8 refs., 28 eqs. English summary p. 154; Japanese summary p. 160. **DWB, DLC**—The solar semidiurnal air tide is computed for an atmospheric profile (Table 1) which was proved earlier to give a satisfactory lunar tide. The profile shows no resonance and the solar tide must therefore be due solely to the semidiurnal heating of the atmosphere. The theoretical computation is compared with recently presented statistical data to infer the necessary heating distribution with height. If the heating in the troposphere is the principal contributor, the observed solar semidiurnal tide may be explained by the eddy diffusion of heat with a coefficient of the order of 10^6 $cm^2 \cdot sec^{-1}$. *Subject Headings:* **1. Atmospheric tides 2. Solar tides 3. Tropospheric heating.**—*Author's abstract.*

12.11–270 551.543.2:519.24

Yang, Chien-chu and Lee, Yu-lan (*both, Inst. Geophys. and Met., Academia Sinica*), **A study on the centers of deviation of the monthly mean pressure from the normal of the Northern Hemisphere.** *Acta Meteorologica Sinica*, Peking, 30(4):297–305, Nov. **1959.** 2 figs., 8 tables, 4 refs. In Chinese; English summary p. 305. **DLC**—In this paper the movement of the centers of deviations of the monthly mean pressure from the normal during the period of Jan. 1930–June 1939 (total 114 months) is studied statistically. The centers of the deviations of the same month are found to concentrate at certain regions, such as south of Alaska, N.E. Atlantic ocean, Arctic coastal region of Eurasia, etc. These regions may thus be considered as key-areas for the occurrence of anomalous circulation over the N. Hemisphere. The majority of these centers may be traced from month to month. During the transitional

seasons, most of the deviation centers are shifted from west to east. Some climatic peculiarit in certain regions of the Northern Hemisphere are discussed on the basis of the interaction these monthly pressure deviation centers. *Subject Headings:* **1. Northern Hemisphere pressu oscillations 2. Mean monthly pressure variations 3. Statistical analysis of pressure data.** *Authors' abstract.*

WIND AND TURBULENCE (551.55/51)

See also: **World of the wind** (Brown), 12.11–37; **Wind velocity meas. by vanes** (Ikonnikova), 12.11–177; **Turbulent diffusion from a continuous fixed source** (Kao), 12.11–191; **Smokestack height determ. from laws of turbulent diffusion** (Wipperman, Klug), 12.11–194; **Waves in the atmos.** (Donn), 12.11–267; **Vert. currents in atmos.** (Arrago), 12.11–307; **Cloud heights and turbulence, monsoon season, S. Asia** (Venkateswara Rao), 12.11–329; **Sound attenuation in free atmos.** (Jorand), 12.11–403.

12.11–271 551.511.6:551.551(

†Hinze, J. O. (*Prof. Fluid Mechanics, Tech. Univ., Delft*), **Turbulence: an introduct to its mechanism and theory.** New York, *McGraw-Hill*, **1959.** 586 p. numerous figs. a eqs., bibliog. at end of each ch. Price: $15.00 (McGraw-Hill Series in Mechanical Engineerin **DLC.** Review by S. J. Kline in *Science*, Wash., D. C., 131(3408):1213, April 22, **1960.**— discussion is organized into seven chapters. The first chapter is of an introductory natu The second chapter is devoted to a discussion of the methods and instruments commo applied in measuring turbulence quantities. In the next chapter the generally accep theories of isotropic turbulence are expounded. The attempts to arrive at a statistical the of nonisotropic turbulence are surveyed in Ch. 4. The subject of Ch. 5 is the diffusive ch acter of transport processes typical of turbulent flows. The last two chapters, 6 and 7, respectively with nonisotropic free turbulence and with turbulent flow along fixed wa *Subject Headings:* **1. Turbulence theories 2. Turbulence mechanism 3. Turbulent ff** —*I.S.*

12.11–272 551.551:53

Kolmogorov, A. N., **Zur Entartung der isotropen Turbulenz in einer inkompressib zähen Flüssigkeit.** [Degeneration of isotropic turbulence in an incompressible viscous flu (In: Limberg, Helmut (*transl.*), **Sammelband zur statistischen Theorie der Turbulenz.** Be Akademie Verlag, **1958.** p. 147–150. 6 refs., 32 eqs.) **DLC** (QA911.L47)—The devia of the mean value of velocity has been based on the assumption of MILLIONSHCHIKOV KOLMOGOROV that the velocity components for a given time and a given point are consid accidental. A new derivation is presented by the author, leading to the same end results, proving that the exponent of the given time in both cases is 5/4. *Subject Headings:* **1. Isotr turbulence 2. Turbulence theories.**—*O.T.*

12.11–273 551.551.2:551

†Blackadar, Alfred K. (*Pa. State Univ.*), **A survey of wind characteristics below 150** *Meteorological Monographs*, Boston, 4(22):3–11, May **1960.** 5 figs., 2 tables, 34 refs., 16 **DWB, DLC**—A survey is given of the important observational and theoretical generaliza of the wind distribution up to about 500 ft, including work by PRANDTL, DEACON, MONIN ELLISON. The vertical distribution of peak gust velocities is also discussed. Some of less precise theories of the wind distribution above 500 ft are also described. *Subject Head* **1. Wind distribution 2. Gust velocities.**—*Author's abstract.*

12.11–274 551.551.2:551.558.21:55

Gerbier, N., **Turbulence sous-ondulatoire et zones de limitation des ondes de res** [Turbulence below waves and limiting regions of orographic waves.] *Germany. Deut Wetterdienst, Berichte*, 8(54):209–211, **1959.** 5 figs. French summary p. 209. **DWB, D** Turbulence arises in the lee of mountains between the ground and an elevation slightly a the crest line. This turbulence may or may not be manifest by clouds as the result of e with horizontal axes of very variable dimensions, on the average 1–2 km, frequently te "rotors." If atmospheric humidity is sufficiently high cumulus or stratocumulus clouds

The cloud base is usually below the mean ridge line while the tops are above it. The importance and development of rotors depend essentially upon the vertical gradient of wind speed and atmospheric stability. The aerological factors influencing the development of waves are the wind direction and velocity and the temperature gradient. Thus the length of the waves becomes slight if the wind speed decreases rapidly or the direction changes suddenly at a given altitude in case of a slight thickness. At tropopause level mobile periodic fluctuations form and come into phase at given moments with projection waves, as a result of the temperature gradient. The jet stream zone favors the development of waves if the direction of the wind is perpendicular to the mountain chain. *Subject Headings:* **1. Rotor clouds 2. Mountain wave formation 3. Orographic effects on turbulence.**—*I.L.D.*

12.11–275 551.501.75:551.551.2:551.558

Gurvich, A. S., **Eksperimental'noe issledovanie chastotnykh spektrov vertikal'noĭ komponenty skorosti vetra v prizemnom sloe atmosfery.** [An experimental investigation of the frequency spectra of the vertical component of wind velocity in the atmospheric layer near the ground.] *Akademiia Nauk SSR, Doklady*, 132(4):806–809, **1960.** 4 figs., 6 refs., eq. **DWB, DLC**—All processes involved in transmission of heat, moisture and momentum in the air layer near the ground are connected with vertical movements of air. Therefore, special attention is given to the study of statistical characteristics of the vertical components of wind velocity and to their relation to the profile of average wind velocity and temperature. A convenient method of experimental study of the pulsations of wind velocity is related to the measurements and analysis of the energy frequency spectrum which indicates the motions of the different magnitudes. The processing of the results of the measurement of the spectrum is carried out on the basis of the theory of similarity, which permits the generalization of the experimental data and determination of the universal spectral function of nondimensional frequencies and parameters, characterizing the conditions of the layer near the ground. Instantaneous values of vertical components of wind velocity are measured with a specially designed acoustic microanemometer. The values, proportional to an electric signal from the microanemometer, are transmitted to the frequency analyser for simultaneous analysis. Further processing of the observed results is described. *Subject Headings:* **1. Vertical wind velocity 2. Wind velocity measurement techniques.**—*N.P.S.*

12.11–276 551.501.75:551.551.2

Obukhov, A. M., **Untersuchung der Mikrostruktur des Windes in der bodennahen Schicht der Atmosphäre.** [Investigation of the microstructure of wind in the atmospheric ground layer.] (In: Limberg, Helmut (*transl.*), **Sammelband zur statistischen Theorie der Turbulenz.** Berlin, Akademie Verlag, **1958.** p. 173–198. 18 figs., 3 tables, 17 refs., 33 eqs.) German summary p. 173. **DLC** (QA911.L47)—A method for the measurement of the fluctuations of the velocity of winds is described. Results of investigation of the microstructure of the wind in the layer near the ground (up to 15 m) are cited. Results of direct measurements of characteristic magnitudes of atmospheric turbulence are compared with conclusions from the theory of local isotropic turbulence. Measurements of vertical components of wind speed and experiments for the determination of Reynolds stress are also described. *Subject Headings:* **1. Wind microstructure 2. Wind velocity variations 3. Vertical component of wind speed.** —*Transl. of author's abstract* (*O.T.*).

12.11–277 551.511.6:551.551.8

†Drimmel, J. and Reuter, H. (*both, Vienna*), **Der Exponent n in Suttons Ansatz für die Lagrangesche Korrelationsfunktion.** [The exponent n in Sutton's formula for the Lagrangian correlation function.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, Vienna, 12(1):24–39, **1960.** fig., 2 tables, 27 refs., 45 eqs. German, English and French summaries p. 24–25. **DLC**—The exponent n in O. G. SUTTON's formula for the Lagrangian correlation function $R(\xi)$, used in the statistical theory of turbulence, may be determined from the vertical wind profile provided the latter is given in the form of a power law, i.e. $u(Z) \sim Zm$. After SUTTON the relation $n = 2\ m/(1+m)$ must hold. It is shown that this relation has to be put in the form $n = m$ in order to avoid some inconsistencies in SUTTON's treatment. The theoret-

ical considerations are in good agreement with experimental results obtained by differe authors. *Subject Headings:* **1. Lagrangian correlation function 2. Sutton's formula 3. St tistical theory of turbulence.**—*Authors' abstract.*

WIND DISTRIBUTION AND VARIATION (551.552/53)

See also: **Deflection of winds and nonstationary phenomena in atmos.** (Reshetov), 12.11–28; **Pilot balloon soundings . . . diverg. of wind speed computation** (Mertsalov), 12.11–155; **Kinematics of local winds, Alazan Valley** (Borisova, Burman), 12.11–207; **Fog at Leeuwarden, Netherlands** (Buma), 12.11–326; **Cloud heights and turbulence, monsoon season, S. Asia** (Venkateswara Rao), 12.11–329; **Dynam. climat. of Mittel-Gebirge,** (Dammann), 12.11–381.

Wind Distribution

12.11–278 551.552/3:551.481

Endrődi, Gabriella, **A talajközeli légréteg szélviszonyai a Balaton térségében.** [Wi condition near the ground around Lake Balaton.] *Időjárás*, Budapest, 63(4):215–220, Jul Aug. **1959.** 5 figs., table, 3 refs. Hungarian and German summaries p. 215. **DLC**—T frequency of wind direction and the daily course of wind velocity are presented on the basis field observations made during two four-week periods in the summer of 1958. The pap deals also with the investigation of the presence of the coastal winds near Lake Balaton, order to get a clearer knowledge of the conditions of circulation. *Subject Headings:* **1. Wi conditions near lakes 2. Lake Balaton, Hungary.**—*Transl. from author's abstract* (*O.T.*).

12.11–279 551.511:551.552:551.524.36(79

Brooks, Frederick A. and Schultz, H. B. (*both, Univ. of Calif. Exper. Station, Davi* **Observations and interpretation of nocturnal density currents.** *UNESCO, Arid Zone Resear* 11:272–277, pub. **1958.** 6 figs., table, 18 refs., 6 eqs. French summary p. 277. **DW** (M84 US8cl)—A report on the observations and interpretations of nocturnal density curre made in California. The quasi-steady tendencies in nocturnal air drainage and natu oscillations in nocturnal cold air flow are discussed. Prandtl laminar flow density curr formulas are applied. The topographic path profiles of the usual nocturnal air drifts flow across a field of the Univ. of California Citrus Experiment Station is shown. *Subject Headin* **1. Nocturnal density currents 2. Prandtl laminar flow formulas 3. Air drainage 4. Californ** —*E.Z.S.*

12.11–280 551.552(521.

Ikeda, M., **On the surface wind in Sakata City.** *Journal of Meteorological Resear* Tokyo, 7(9):586–590, Oct. **1955.** 13 figs., table. In Japanese. **DWB, DLC.** Also in *Sena Japan. Central Meteorological Observatory, Bulletin of the Meteorological Society for Resea of Tohoku District*, 9(1):64–68, Nov. **1955.** 13 figs., table. In Japanese.—During a co parative study of the relation between fog prevention forests and monsoons (which are str in winter at Sakata City), wind velocity was observed by the weather station and 9 tempor stations in the city from Nov. 1953 to Jan. 1954, using both Robinson's anemometer w electric recording. The resulting monthly mean wind velocity, maximum wind velocity 10 minutes and the distance between fog-prevention-forest was obtained by each station these results compared with those obtained during 1937–1948 and 1948–1952. It was c cluded that there was not much difference between any different stations, but if wind direct and velocity are known, the influence of orography and building construction upon the could be deduced for the monsoon season. *Subject Headings:* **1. Surface wind analysis 2. W velocity 3. Sakata City, Japan.**—*K.C.*

Wind Variation

12.11–281 551.553.21:551.5

*†Flohn, H. (*Deutscher Wetterdienst*), **Monsoon winds and general circulation.** Symposium on Monsoons of the World, New Delhi, Feb. 19–21, 1958, [Proceedings]. N

Delhi, 1960. p. 65–74. 5 figs., 15 refs., eq.) **DWB** (M53.21 S989sy) —Starting from a purely descriptive definition of monsoon winds as predominant air currents with a marked seasonal shift, the classical explanation of monsoons will be compared with their geographical distribution. From a comparison of oceanic and continental conditions on the globe - using for example the central Pacific and the Indo-Australian Section (or Africa)—the hypothesis will be discussed that monsoonal wind shifts are largely caused by the seasonal transfer of the planetary wind and pressure belts over a continental section, due to the strong response of continental surfaces to the seasonal variations of solar radiation. The zonal pattern of monsoons will be described (according to a map of KHROMOV). In relation to this, lapse rate and raininess of tropical monsoons are strongly correlated with the zonal (and meridional) wind components. *Subject Headings:* **1. General circulation 2. Monsoon winds 3. Solar radiation variations 4. Planetary pressure belts.**—*Author's abstract.*

12.11–282 551.553.21:551.513.1 (5–012)

*†Flohn, H. (*Deutscher Wetterdienst, Frankfurterstr*), **Recent investigations on the mechanism of the "summer monsoon" of Southern and Eastern Asia.** (In: Symposium on Monsoons of the World, New Delhi, Feb. 19–21, 1958, [**Proceedings**]. New Delhi, **1960.** p. 75–88. 11 figs., table, 25 refs.) **DWB** (M53.21 S989sy)—Based on all available climatological data, the formation of a quasi-persistent anticyclonic cell over the Tibetan Plateau, at 500 mb during summer, is demonstrated, caused by the excessive heating of the middle troposphere. The rapid advance of the Intertropical Convergence Zone towards north, described as "burst of monsoon," is related to a reversal of the meridional gradients of temperature and pressure, a fact which could also be revealed from statistical studies. On the basis of about 130,000 punched maritime observations from two meridional strips of the Indian Ocean, near long. 65° and 85°E and north of lat. 6(IO)°S, the average pattern of wind, cloudiness and precipitation is investigated: 10-day averages are used to demonstrate the "singularities" of the annual course. The transport of water vapor over India and the coasts of Eastern Asia is derived from aerological data. *Subject Headings:* **1. Summer monsoon mechanism 2. Intertropical Convergence Zone 3. Singularities 4. Meridional circulation 5. Far East.**—*Author's abstract.*

12.11–283 551.553.21:551.513.1 (691)

Frolow, S. (*Met. Serv. of Madagascar, Tananarive*), **La non existence de la mousson à Madagascar.** [The nonexistence of the monsoon in Madagascar.] (In: Symposium on monsoons of the World, New Delhi, Feb. 19–21, 1958, [**Proceedings**]. New Delhi, **1960.** p. 101–104. English summary p. 101.) **DWB** (M53.21 S989sy)—The views of the meteorologists of Madagascar on the system of currents that should legitimately be designated as monsoon in contradistinction to the various definitions prevalent in numerous works on Madagascar are described. In the present study and examination of the different parts of the intertropical regions, India and other regions where conditions are similar are included, the continent of Africa is considered primarily. In summarizing briefly the results it is proposed that the principle of the mechanism of continental thermal low of the monsoon which can acquire different forms with or without seasonal reversal of wind as has been observed in many parts of the world does not apply in the region of Madagascar and generally to the parts southwest of the Indian Ocean, and it is concluded thus that the monsoon does not exist over Madagascar. *Subject Headings:* **1. Monsoon circulation 2. Madagascar.**—*Author's abstract.*

12.11–284 551.553.21:551.513.1 (213)

†Koteswaram, P. (*Met. Off., New Delhi*), **Asian summer monsoon and the general circulation over the tropics.** (In: Symposium on Monsoons of the Worlds, New Delhi, Feb. 19–21, 1958, [**Proceedings**]. New Delhi, **1960.** p. 105–110. figs., 16 refs.) **DWB** (M53.21 S989sy)—An examination of the high tropospheric wind circulation over the tropics in northern summer indicates a broad easterly flow over the Asian and African summer monsoon areas with an easterly jet stream over low latitudes. The core of the jet stream is located approximately over 15°N at a pressure level of 150 to 100 mb over South Asia and about 10°N over Africa. The burst of the SW monsoon over India and its fluctuations as well as the formation of monsoon depressions are seen to be associated with the perturbations in the upper easterly

current. Since the easterly jet stream is found only over South Asia and Africa and not ov the tropical Atlantic and Pacific Oceans, it has been suggested that the current originates a result of the large scale distribution of land masses and ocean and with the elevated he source of the Tibetan plateau. A vertical circulation cell with the heat sources over th plateau and sinks over the equatorial regions is indicated, according to which the S.W. monso is pictured as a poleward return current in the lower troposphere. *Subject Headings:* **1. Tropi circulation 2. Heat sources and sinks 3. Monsoon circulation 4. Jet stream 5. Asia.** *Author's abstract.*

12.11–285 551.553.21:551.511:551.515.11(2

§*Koteswaram, P. (*Met. Off., New Delhi*) and George, C. A. (*Met. Off., Calcutta Airpo* **Case study of a monsoon depression in the Bay of Bengal.** (In: Symposium on Monsoo of the World, New Delhi, Feb. 19–21, 1958, [**Proceedings**]. New Delhi, **1960.** p. 145–1 4 figs., 7 refs., 7 eqs.) **DWB** (M53.21 S989sy)—The analysis of a monsoon depression in Bay of Bengal shows that vorticity advection associated with an upper troposphere easte wave led to the formation of the depression. Warm advection from the north after the init tion of the low level vortex aided its intensification and movement. The depression mo towards the zone of the maximum Laplacian of warm advection ahead of it. The Laplac of the surface pressure tendency gave a useful indication of zones of low level convergence a consequent heavy rainfall. The vertical extent of the cyclonic circulation and the associa upper tropospheric flow patterns are also discussed. *Subject Headings:* **1. Monsoon depressi 2. Upper tropospheric flow patterns 3. Bay of Bengal.**—*Authors' abstract.*

12.11–286 551.553.21:551.513.1(5

Krishna Rao, P. R. (*Met. Off., New Delhi*), **Indian northeast monsoon in relation to general circulation** [abstract only]. (In: Symposium on Monsoons of the World, New De Feb. 19–21, 1958, [**Proceedings**]. New Delhi, **1960.** p. 89.) **DWB** (M53.21 S989sy The chief features of the surface and upper air circulation up to 20 km over India and surrounding areas in October to January are described in relation to the seasonal changes in general circulation between July and January. The depth of the northeast monsoon cur over the Bay of Bengal, the mechanism of the northeast monsoon rainfall over south Indi October to December, the nature of disturbances of the Bay of Bengal in the northeast mons season are dealt with. The thermal structure of the atmosphere over Madras in a ty northeast monsoon month is presented. *Subject Headings:* **1. General circulation over I 2. Monsoon circulation 3. Thermal structure of the atmosphere 4. India 5. Bay of Ben** —*Author's abstract.*

12.11–287 551.553.21:551.513.1(

Malurkar, S. L. (*Colaba Obs., Bombay*), **Monsoons of the World—Indian monsoons.** Symposium on Monsoons of the World, New Delhi, Feb. 19–21, 1958, [**Proceedings**]. Delhi, **1960.** p. 92–99. 5 refs.) **DWB** (M53.21 S989sy)—Monsoons in the Indian practically cover the tropical and subtropical circulation and their reactions stand out the year. In the field of "trades" over a wide stretch of ocean, shallow low pressure a denoted as 'pulses' move in a westward direction and under specific conditions cross ov the other side of the equator to form the fresh monsoon air (*Em*) either to strengthen monsoon there or to feed to a westward moving tropical depression. Along with these monsoon "pulses," low pressure areas from the east with origin in the same hemisphere bedded in the Far Easterly air (*Tr*) and continental dry air (*Tc* or *Tcm*) can be detected i general field. The strengthening and 'break' of the Indian southwest monsoon are indi by concurrent changes in the flow patterns of each of the three streams. While *Em* acts source, *Tc* as a sink; the role of *Tr* is as a brake on the release of energy between contig streams before vorticity in these low latitudes is built up. Release of energy and develop of vorticity in the equatorial latitudes have to be considered distinct from that in nor latitudes. A westward moving tropical depression in South Indian Ocean prevents crossing of 'pulses' to the north of the equator except much further west of the depression such two westward moving tropical depressions, one on either side of the equator wit

mall longitude interval cannot long co-exist. Both or one of them should either fill up or ecurve. The effect of the high pressure belts in the sub-tropics considerably modifies the irculation, and it would be reasonable that effects on the poleward and equatorward side of he high pressure cells would in a way be related to winter and summer weather. The thunderstorms on the poleward side of the high pressure belt, taking account of daily displacements roduce a sufficient drop of wet bulb temperature (frontal thunderstorms). The thunderstorms on the equatorward side of the high pressure belt do not show a drop in wet bulb temperatures (heat thunderstorms). *Subject Headings:* **1. Monsoon circulation 2. General irculation over India 3. Heat sources and sinks 4. India.**—*From author's abstract.*

12.11–288 551.553.6

*Durst, C. S., **Wind speeds over short periods of time.** *Meteorological Magazine*, London, 9(1056):181–186, July 1960. fig., 8 tables, 6 refs. **DWB, DLC**—An attempt to make a tatistical assessment of wind speeds likely to occur in short intervals of time when the mean ourly wind speed falls in certain ranges. The figures obtained refer only to a site in which he wind has an unobstructed field and the topography is flat. Much of the data were taken rom GIBLETT (1932). Mean hourly wind speed range from 20 to 80 and averages for short eriods 10 min, 1 min, 30 sec, 20 sec, 10 sec, 5 sec and ½ sec are given. *Subject Heading:* **. Wind speed estimation.**—*E.Z.S.*

12.11–289 551.553.6:551.43(438)

*†Lewińska, Janina, **Rozkład i ozęstotliwość kierunków dolnych pradów powietrza w olskich Tatrach.** [Directional frequency distribution of surface wind in the Polish Tatra Mountains.] *Poland. Pánstwowy Instytut Hydrologiczno-Meteorologiczny, Wiadomości Sluzby*, (5):239–252, **1959.** 19 figs., 4 tables, 27 refs., eqs. Russian and French summaries p. 252. **)WB, DLC**—The author discusses surface wind directions in the Polish Tatra Mountains. he results, obtained from data contributed by 16 meteorological stations, are as follows:) the dominant winds conform to the contours of the valleys and passes for southwest and est wind directions; 2) the great frequency of winds from a northerly direction at Kasprowy Vierch is due to the free influx of atmospheric currents from this direction; 3) the weak inidence of winds from the north quadrant does not show up in the monthly and annual means, ue to protection by the Spiz-Gubalowka and Gorce Mountains; 4) a weak seasonal variation s observed. A large number of wind rose charts and corresponding tabular data are included. *ubject Headings:* **1. Surface wind directional frequencies 2. Tatra Mts., Poland.**—*From rench summary (A.L.M.).*

VERTICAL DISTRIBUTION (551.554)

See also: **Wind characteristics below 1500 ft** (Blackadar), 12.11–273.

12.11–290 551.524.4:551.554:532.5

Kano, K.; Takeuchi, K. and Asada, M. (*all, Japan Met. Agency, Tokyo*), **Experimental nvestigations on the velocity and temperature distribution on a flat plate placed horizontally n a uniform stream and heated from below.** *Meteorological Society of Japan, Tokyo, Journal*, er. 2, 38(1):61–71, Feb. 1960. 17 figs., table, 6 refs., 8 eqs. English summary p. 61; Japanese ummary p. 71. **DWB, DLC**—For the purpose of presenting information on the flow in the tmosphere near the earth's surface, experimental investigations of the turbulent boundary ayer on a horizontal flat plate placed in a uniform stream and heated from below have been onducted using a JMA wind tunnel. 22 observations of the mean velocity and the mean emperature in the boundary layer were obtained simultaneously for the ranges $1.8\ \text{m/s} < U_\infty < 13\ \text{m/s}$ and $15\ \text{deg} < \Delta T < 90\ \text{deg}$. Results: within these ranges, the distributions of velocity nd temperature in the middle portion of turbulent boundary layer are nearly logarithmic. imilarity between the velocity and the thermal fields in the entire region of the boundary ayer was, however, not found. These profiles are, on the other hand, also well represented y power law formulas. The Richardson number of the flow field in the above mentioned ortion of the layer is found to be nearly proportional to the height z from a wall. *Subject*

Headings: **1. Turbulent boundary layer velocities 2. Turbulent boundary layer temperatu** —*Authors' abstract.*

12.11–291 551.501.75:551.

Shvets, M. E. and Kagan, R. L., **K voprosu o predvychislenii vertikal'noĭ skoros atmosfere.** [Precalculation of vertical velocity in the atmosphere.] *Leningrad. Glavn Geofizicheskaia Observatoriia, Trudy*, No. 99:123–130, **1959.** 5 refs., 24 eqs. **DWB**—In theoretical paper, the authors integrate the equation for vertical speed $\tilde{W}\left(\tilde{W}=\frac{1}{P_0}\frac{dP}{dt}\right)$ the semi-linear method, assuming that the stability parameter is a function of height. method makes it possible to solve the problem for case of continuity of the stability param and for the discontinuity case when the discontinuity point is not marked. *Subject Headi* **1. Vertical velocity 2. Stability parameters.**—*A.M.P.*

12.11–292 551.501.75:551.

Thornthwaite, C. W. and Superior, W. J., **Measurement of vertical winds in typical terr** Thornthwaite, C. W., Associates. Laboratory of Climatology, Contract DA 36-309 SC-84 First Quarterly Progress Report, July 1, 1960 to Sept. 30, 1960, issued Oct. **1960.** 8 p. 5 **DWB**—The report describes preliminary work on a study of the vertical winds over diffe typical terrains. The work is divided into three tasks: instrumentation, site selection, data analysis. Work this quarter has involved manufacture, testing and calibrating measuring instruments, assembly of instrument masts, and design of a mobile instrun trailer. A number of observation sites were studied and certain sites having markedly diffe terrains have been selected for future use. *Subject Heading:* **1. Vertical wind measure techniques.**—*NASA.*

LOCAL WINDS AND WIND EFFECTS (551.555/56)

See also: **Physics of blown sand and desert dunes** (Bagnold), 12.11–13; **Hurricane effects on forests, Puerto Rico, 1956** (Wadsworth, Englerth), 12.11–92; **Snow and wind loads on buildings** (Legget, Schriever), 12.11–98; **Wind drift in waters of S. Calif. shelf** (Stevenson), 12.11–125; **Gen. circ. in summer, Asia** (Dao, Chen), 12.11–223; **Chloride carried inland by maritime winds** (Woodcock), 12.11–331.

12.11–293 551.555(44

Monin, M., **Les vents caractéristiques de la région de Grenoble.** [Characteristic w in the region of Grenoble.] *France. Météorologie Nationale, Monographies*, No. 19, M **1960.** 29 p. 21 figs., 3 tables. **DWB**—This article constitutes a local climatography o Grenoble region with particular stress on the local winds. The comparison of winds in Grenoble region with those observed at St. Etienne de St. Geoirs, which is in an interme situation between the Rhone valley currents and those crossing the Alps, shows the chara istics of the local winds at Grenoble. The Grenoble region is situated at the junction valleys and is surrounded by 3 mountain masses—the Vercors, Chartreuse and Belled This special orographic situation creates 3 different types of local winds: valley winds, mou breezes and south winds. Tables and graphs indicate the wind frequencies, wind roses wind speeds as well as information on upper air winds. The last part concerns the influ of S winds on temperature and humidity in the Grenoble region. This study shows tha prevalence of NW winds during daytime can be explained through a valley breeze effect. the contrary, the E winds blowing at the end of the night are connected with a mou breeze effect. The föhn phenomenon manifests itself very conspicuously through winds the southern sector which descend towards the valleys after having crossed the Ver Under the southern wind influence the severity of the winter season is sometimes replace sudden rises in temperature. *Subject Headings:* **1. Local climates 2. Local winds 3. M tain and valley winds 4. Grenoble, France.**—*A.V.*

12.11–294 551.311.31:551.

*Liu, Chen-hsing (*Geophy. Met., Academia Sinica*), **Movement of dune under the a of wind.** *Acta Meteorologica Sinica*, Peking, 31(1):84–91, Feb. **1960.** 7 figs., 6 tables, 3

2 eqs. In Chinese; English summary p. 91. **DLC**—Under the assumption of simple topography without obstacles, the moving speed of a dune can be calculated by the following formula,

$$C = \frac{Q_0}{p_s H}, \tag{1}$$

where C = the moving speed of dune; p_s = the density of the sand; H = the height of the dune. In collaboration with the formula of transfer rate Q_0, the formula of the moving speed of the dune at different height was presented by

$$C = \frac{A'}{p_s H}\frac{p}{g}\frac{(u-u_0)^3}{\left\{3AK\frac{1}{3}\left[\left(\frac{z}{L}\right)^{-\frac{1}{3}} - \left(\frac{z_0}{L}\right)^{-\frac{1}{3}}\right]\right\}^3}, \tag{2}$$

where u_0 = constant. Tables show the result of calculation on the transport (transfer) rate and moving speed of dune, proving that this formula was in agreement with an actual observation. *Subject Headings:* **1. Wind effects on sand movement 2. Sand dune-wind relationships.** —*K.C.*

12.11–295 551.556.4:551.311.31

Liu, Chen-hsing (*Geophys. Met., Academia Sinica*), **Transfer of sand in the surface layer.** *Acta Meteorologica Sinica*, Peking, 31(1):75–83, Feb. **1960.** 6 figs., 8 refs., 31 eqs. In Chinese; English summary p. 82–83. **DLC**—It was found that $\frac{3}{4}$ of the sand transfer on and next to the sand dune is through the process of jumping. Whenever the turbulent velocity of wind reaches a critical value, sand particles of a certain dimension begin to jump. Under the action of gravity, these particles after traveling a distance collide with another group of particles and fall after imparting their momentum. Assuming that the collision between sand particles is elastic, the author presents a fundamental equation on the transfer rate

$$Q_0 = 2.13\frac{2}{3Cd}\frac{p}{g}V^{3*} = A'\frac{p}{g}V^{3*},$$

where Cd is the drag coefficient of a single particle; p = the density of air, V^* = friction velocity, A' = a function of the particle diameter D. Based on the theory of turbulent diffusion, the distribution of sand in different stratifications of the atmosphere is discussed in relation to neutral and stable atmosphere. Lastly, the transfer of suspended sand is calculated under three conditions: neutral, stable and unstable atmosphere. *Subject Headings:* **1. Wind effects on sand grains 2. Sand transport by wind.**—*K.C.*

12.11–296 551.556.8:551.465(261.2)

Lauwerier, H. A., **The North Sea problem, Pt. 3, Influence of a stationary windfield upon a bay with an exponentially increasing depth.** *Akademie van Wetenschappen te Amsterdam, Proceedings, Ser. A, Mathematical Sciences*, 63(3):279–290, **1960.** 2 figs., 5 tables. **DLC**—This paper studies the influence of a stationary linear wind field upon a rectangular bay which has a variable depth which is indicated by an exponential law. This model is a much better representation of the North Sea than the model with a uniform depth. The elevation at the "Dutch" coast due to the linear wind field is given in a table and is graphically illustrated in a figure. The general conclusion can be drawn that through the combined effect of the bottom slope (α) and the Coriolis force (Ω) the influence of the rotation terms of the wind field is greatly enhanced. The following conclusions can be drawn: 1) for a uniform N-S wind the elevation at the "Dutch" coast does not depend on the bottom profile nor on the rotation of the earth; 2) for a uniform W-E wind the elevation at the "Dutch" coast is largely influenced by α and Ω; 3) for the given model the most unfavorable direction for a uniform wind as regards the elevation at the "Dutch" coast is about 15° NNW; 4) The influence of α and Ω upon the contributions of the divergence terms to the elevation at the coast is rather small and 5) the influence of α and Ω upon the contributions of the rotation terms to the elevation at the south

coast is very large. *Subject Headings:* **1. Wind effects on coastal waters 2. Coriolis effects currents 3. North Sea.**—*Transl. of author's abstract (A.V.).*

UPPER AIR WINDS (551.557)

See also: **Seasonal patterns of gen. circ.** (Pogosian), 12.11–224; **Solar radiation in snow cover** (Lebedeva, Minaeva), 12.11–241; **Total radiation attenuation by clouds** (Prokh), 12.11–250; **Winds at 30,000 and 40,000 ft, Australia-New Zealand-Fiji area** (Phillpot), 12.11–372.

12.11–297 551.557:519.24

Charles, B. N. (*Sandia Corp., Albuquerque*), **Lag correlations of upper winds.** *Jour of Meteorology*, Boston, 16(1):83–86, Feb. **1959.** 3 figs., 5 refs., 4 eqs. **DWB, DLC**—Us 1500*Z* winds for the period March 1951–Feb. 1956, the author computed lag correlat coefficients of the zonal and meridional wind components and the vector dot-product corre tion coefficient (the "temporal stretch vector correlation coefficient"); for the latter equation is $r(V\cdot V)=\frac{\Sigma(u_0u_t+v_0v_t)}{u\partial V^2}$ where u and v are departures of the zonal and meridi components from their mean values respectively, and σ=climatological standard deviat Vertical profiles of the stretch vector correlation coefficient for summer (June–August) winter (December–February) and also the vertical profile of the mean wind magnitude its vector standard deviation are presented. The figures indicate the presence of signifi variations in the patterns of the lag correlation at altitudes greater than 10,000 ft. At sev locations the lag correlation at the highest altitudes exceeds 0.5 for lags exceeding two d If the lag correlation exceeds 0.5 a persistence forecast will incur, less error variance tha climatological forecast. The vertical profiles of the lag correlations for most stations in winter season indicate that the lag correlation coefficient considerably exceeds 0.5 at the hi altitudes. Hence under these conditions, even the persistence forecast would be superior climatological prediction and it in turn would be surpassed by the objectively weighted c bination of persistence and climatology. *Subject Headings:* **1. Upper air wind compon 2. Lag correlation coefficients 3. Persistence.**—*I.L.D.*

12.11–298 551.501.75:551.590.25:551

Elford, W. G. and Murray, E. L. (*both, Dept. Physics, Univ. Adelaide, So. Austra* **Upper atmosphere wind measurements in the Antarctic.** *International Space Science posium, Nice, Jan.* 1960, *Space Research: proceedings of the First Symposium.* Pub. I p. 158–163. 2 figs., 5 refs. Russian summary p. 158. **DWB** (523.1 161sp)—Winds in height range 80–100 km have been measured at Mawson, Antarctica, by the radio observa of drifting meteor trails. Preliminary results indicate that the diurnal behavior of the w can be described in terms of three horizontal components: a prevailing component and oscillatory components with periods of 24 and 12 hours. These features are in common the general pattern of winds in this region determined at lower altitudes. The prevailing is characterized by a strong meridional component. The direction and magnitude of component measured at Mawson and at medium latitude stations are consistent with a zontal divergence of air at this level from the Summer pole. *Subject Headings:* **1. Upp wind measurement 2. Radio meteor trail observation techniques 3. Mawson, Antar** —*Authors' abstract.*

12.11–299 551.501.75:551.507.362.1:55

Manring, Edward R. and Bedinger, J. (*both, Geophysics Corp., Boston*), **Winds i atmosphere from 80 to 230 km.** *International Space Science Symposium, Nice, Jan. Space Research: proceedings of the First Symposium.* Pub. **1960.** p. 154–157. 2 refs. R summary p. 154. **DWB** (523.1 161sp)—Wind determinations from two Nike-Asp r launched from Wallops Island, Virginia, are presented. The data reduction is far from plete and only the salient wind features have been measured. During morning tw Aug. 17, 1959, winds from 140 to 200 km were from 250 to 110 m per sec, blowing towa southwest. Measurements from 80 to 190 km for evening twilight, Nov. 18, 1959 ar

sented and comprise a complicated pattern in both direction and amplitude. *Subject Headings:* **1. Upper air winds 2. Rocket observation of upper air winds 3. Wallops Island, Va.**—*Authors' abstract.*

12.11–300 551.557(510)

Yang, Ta-cheng (*Peking Univ.*), **Wind profile in the upper planetary boundary layer over Peking.** *Acta Meteorologica Sinica*, Peking, 28(3):185–197, **1957.** 7 figs., 16 refs., 15 eqs. In Chinese; English summary p. 197. **DLC**—The wind data from free balloon at Peking in the years 1954–1955 are analyzed and are grouped according to the wind velocity at a 500 m level into three sets, namely: strong, moderate and light wind. Since the data are abundant for moderate wind, and its wind profile is more representative, a theoretical investigation is proposed. Assuming the turbulent coefficient K varies with height according as $K=(7.7\text{–}4.8\times10^{-3}z)^2$ for $z\leqslant 900$ m; and $K=\text{const}=12$ m²/sec for $z\geqslant 900$ m, it is found that the calculated wind profile agrees very well with the observation. Finally, some comments are given to the new method proposed by D. L. Laĭkhtman for the determination of the turbulent coefficient K from wind data. *Subject Headings:* **1. Wind profiles 2. Upper air wind studies 3. Peking, China.**—*Author's abstract.*

12.11–301 551.557.2:551.524.72:551.510.52/3

*†Chiu, Wan-cheng (*ed.*), **Studies of the properties of the wind and temperature fields of the upper troposphere and lower stratosphere.** New York University. Research Division. College of Engineering. Dept. of Meteorology and Oceanography, Contract AF 19(604)-1755, Final Report, Jan. 31, **1960.** 232 p. numerous figs., tables, refs. and eqs. Eight articles by Chiu, Richard S. Greenfield, Paul A. Davis, Edward G. Albert and James D. Kangos, all reprints, and separately abstracted elsewhere.—This report contains eight articles describing the properties of the wind and temperature fields of the lower stratosphere and upper troposphere, and the properties of the tropopause. The first article describes the mean wind field on the basis of observed winds only. In the second article the diurnal temperature variation of the lower stratosphere over the U. S. is evaluated and reported. The magnitudes of the diurnal temperature variation processes are indicated in the next article. The diurnal temperature variation near the tropopause due to a diurnal variation of terrestrial radiation, calculated from the radiation equations, is reported in the fourth article. The following two papers study the power and cross spectra of the wind and temperature in the upper troposphere and lower stratosphere over North America. In the last two articles are reported, in order, a case study of the tropopause in temperate latitudes, and a single station analysis of the tropopause at high latitude. *Subject Headings:* **1. Wind field properties 2. Temperature field properties 3. Troposphere 4. Stratosphere.**—*I.S.*

12.11–302 551.557.2:551.510.53:551.587

Dubentsov, V. R., **Vozdushnye techeniia v stratosfere.** [Air currents in the stratosphere.] *Meteorologiia i Gidrologiia*, Moscow, No. 11:3–15, Nov. **1959.** 7 figs., 5 refs. **DWB, DLC**—In order to verify the mean temperatures at high altitudes as measured with radiosondes, auxiliary maps giving temperature variations from level to level, maps of mean temperature for each surface and maps of relative topography of the intermediate layers. The resultant wind for each level was calculated. Here maps give an adequate picture of the geopotential field and the mean wind. In this study maps for July 1957 and January 1958 for the AT_{200}, AT_{100}, AT_{50}, AT_{30}, AT_{20} and AT_{10} are presented and the pressure and temperature fields and the geopotential fields are examined. A comparison of different levels indicates that while the field of flow at 200 and 100 mb in January is symmetrical in relation to the pole, such symmetry is not observed at the 50–10 mb level. This asymmetry is especially perceptible in the Northern Pacific Ocean where stratospheric jet stream flow is as it were pressed to the pole by an extensive anticyclone. In the anticyclonic region in the stratosphere the atmospheric temperature is about 15–20° higher than at corresponding latitudes over the Pacific Ocean. The fluctuation amplitude does not exceed 10°C. These stable temperatures in the stratosphere are caused probably either by descending or by direct warming of stratospheric air by increased ozone content. A mean meridional section from the pole to equator is presented.

Subject Headings: **1. Stratospheric warming 2. Stratospheric winds 3. Stratospheric te peratures 4. North Pacific Ocean.**—*I.L.D.*

12.11–303 551.510.534:551.55

Shimizu, M., **Meridional distribution of atmospheric ozone and zone of maximum we erlies at 200 mb level.** *Journal of Meteorological Research*, Tokyo, 12(4):185–188, Ap **1960.** 3 figs., 7 refs. In Japanese; English summary p. 185. **DWB, DLC**—Making use the total amount of atmospheric ozone observed at 3 stations (Sapporo, Tateno and Torishim all of which are nearly on meridian 140°E, and the wind aloft data at 200 mb level, so investigations are made on the meridional distribution of ozone amount. The conclusi obtained are summarized as follows: 1) The total amount of ozone at Tateno is of the sa order magnitude as at Sapporo, when the zone of maximum westerlies is in the south of Tate 2) On the other hand, it decreases and becomes the same order in magnitude as that at T shima when the zone moves to the north of Tateno. 3) At the time when the zone mo further to the north of Sapporo, the ozone amount at Sapporo decreases and three stati become to have the ozone amount of the same order magnitude. 4) The meridional gradi of atmospheric ozone amount is large at the latitudes of maximum westerlies. *Subject He ings:* **1. Atmospheric ozone distribution 2. Upper air wind data 3. Japan.**—*Author's abstr*

12.11–304 551.558.2:551.557.3:551.51

Faust, Heinrich (*Offenbach a.M.*), **Die Schwachwindschicht in der unteren Stratosph als Nullschicht.** [The weak wind layer in the lower stratosphere as the zero layer.] *teorologische Rundschau*, Berlin, 13(3):75–85, May/June **1960.** 6 figs., 3 tables, 11 r German summary p. 77. **DWB, DLC**—The connection of a persistent layer of wind minim with the reversal of the large scale vertical movement can be demonstrated simply. Suc "zero layer of 2nd order" (Attmannspacher) connected with a nongradient mass-flux f high to low pressure is demonstrated in winter with a wind minimum at 19 km altitude. T is no real mean minimum at this altitude in summer due to dominant West winds below negative East winds above this level (zero point). The vertical movements can become also in this summer "zero layer of 3rd order" but without reversal of the sign. The large s vertical movements from below and above decrease slowly toward this layer being absolu independent of each other. "Zero layer of 3rd order" represents also a mathematical in mediary between a "zero layer of 1st and 3rd order." *Subject Headings:* **1. Vertical mo 2. Zero layer 3. Stratospheric winds.**—*O.T.*

12.11–305 551.557.31:551.51

Mantis, Homer T. (*Univ. Minnesota*), **On a diurnal variation of stratospheric wi** *Journal of Meteorology*, Boston, 17(4):465–468, Aug. **1960.** 3 figs., 2 tables, 3 refs. **D DLC**—The relatively large intermediate scale variance of the summer stratospheric east is not directly related to oscillations with solar or lunar tidal periods. A significant di variation of the meridional component of the wind with an amplitude of the order of 1 m has been detected at latitudes below 20N, and an equally large diurnal oscillation ap likely at 45N. The phase of the diurnal variation of the meridional velocity fluctuati low latitudes appears to lead the wave at 45N by about 90 deg. The relatively large ampli of the diurnal wind variation at low latitudes as well as the displacement of phase with lat suggests that, unlike the semidiurnal pressure wave where the centers of the cells are a equator, the centers of the cells of this diurnal pressure wave are located above the equ *Subject Heading:* **1. Diurnal stratospheric wind variations.**—*E.Z.S.*

12.11–306 551.511.6:551.557.5:6

Laĭkhtman, D. L. and Shnaĭdman, V. A., **Kriterii ustanovivsheĭsia turbulentno struĭnykh techeniiakh.** [Criteria of steady turbulence in the jet stream.] *Meteorolog Gidrologiia*, No. 12:11–13, Dec. **1960.** fig., table, 2 refs., 11 eqs. **DWB, DLC**—The turbu coefficient, the gustiness of the wind and thickness of the turbulent layer near the jet st can all be derived from the equations of motion and the equations for the balance of turb energy taking account of dissipation, which have previously been derived by the au

These equations are quoted here and from them a graph has been drawn giving their values as functions of a parameter M which is akin to the Richardson number. A trial using the graph for cases of jet streams in the Leningrad area during 1957 proved to be satisfactory. *Subject Headings:* **1. Jet stream turbulence 2. High level turbulence.** *R.B.*

VERTICAL MOTION (551.558)

See also: **Wind structure and heat balance, lower tropos., Tibetan Plateau** (Yeh et al.), 12.11–214; **Heat transfer from ground to air** (Priestley), 12.11–263; **Turbulence below waves and limiting regions of orographic waves** (Gerbier), 12.11–274; **Frequency spectra of vert. wind velocity** (Gurvich), 12.11–275; **Weak wind layer in lower stratos. as zero layer** (Faust), 12.11–304.

12.11–307 551.501.75:551.558:551.551

Arrago, L. R., **O vertikal'nykh tokakh v atmosfere nad termicheski neodnorodnoĭ poverkhnost'iu.** [Vertical currents in the atmosphere above a thermally inhomogeneous surface.] Leningrad. *Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 99:112–122, **1959.** 7 figs., 9 refs., 41 eqs. **DWB**—A simplification of the Dorodnitsyn method of obtaining approximate solution for a system of equations in series form for turbulent flow caused by nonuniform heating of the underlying surface. The simplification which excludes the consideration of the Coriolis force makes it possible to arrive at qualitative and quantitative deductions on vertical speeds originating above thermally inhomogeneous surfaces of small extent. An analysis of the formulas, examples of calculation and a survey of results are added. *Subject Headings:* **1. Vertical currents 2. Turbulent flow.**—*A.M.P.*

12.11–308 551.558.1

Haltiner, G. J. and Chase, E. M. (*both, U. S. Naval Postgraduate School*), **Some further results on convective currents.** *Tellus*, Stockholm, 12(4):393–398, Nov. **1960.** 4 figs., table, 4 refs., 17 eqs. **DLC**—An earlier theory of steady state, saturated convective currents is modified to include the drag of the condensed liquid water on the rising air. The system of equations is numerically integrated for several cases in which the entrainment is allowed to assume negative values. Results appear to indicate improvement over the earlier model. *Subject Headings:* **1. Convective currents 2. Entrainment.**—*Authors' abstract.*

12.11–309 551.558.21:551.43

Palm, Enok and Foldvik, Arne, **Contribution to the theory of two-dimensional mountain waves.** *Geofysiske Publikasjoner*, Oslo, 21(6) March **1960.** 30 p. 16 figs., 21 refs., numerous eqs. English summary p. 1. **DLC**—a. Mountain waves at high altitudes are studied in two models in order to examine the effect of these waves on the formation of mother-of-pearl clouds. It is found that with a mountain 700 m high the maximum displacement at 20–30 km is about 400 m in both models and that the maximum vertical velocity in this region is 1 m sec^{-1} in one model and 3.5m sec^{-1} in the other model. b. The influence of wind and stability in the stratosphere on the wave motion in the lower troposphere is discussed. It is shown that if $f(z)$ (defined in the list of symbols) has a value at the ground which is at least 2.5 times as large as the minimum value of $f(z)$ (located at about 7–10 km above the ground), the wave motion in the lower troposphere is only depending on wind and stability beneath the level of minimum $f(z)$. This condition is usually satisfied when mountain waves occur. c. For distributions of $f(z)$ fulfilling the requirement above, the motion near the ground may be obtained from a simple one-layer model. Such a model based on observed wind and stability is studied in section 5. A diagram is given from which the wave lengths are found directly without any computation. The drag on the mountain is computed in two cases. Nonlinear effects are discussed, and the streamline field is found for three different mountains leading to motions with and without rotors depending on the height of the mountain. With the applied distribution of wind and stability, it is found that rotors occur when the mountain is higher than 600 m. *Subject Headings:* **1. Mountain wave theories 2. Mother-of-pearl cloud formation 3. Rotor clouds.**—*Authors' abstract.*

12.11–310 551.541:551.558

Scorer, R. S., **Lee waves in the atmosphere.** *Scientific American*, N. Y., 204(3):124–1 March 1961. 19 figs. **DWB, DLC**—Following an introductory discussion and definition lee waves, consideration is given to the problem of analyzing the flow of air, stratified in cc plex fashion, over an obstacle of complex shape. Lee waves are explained as gravity wa of a special type and are regarded as standing waves. A review is given of earlier studies of waves by sailplane pilots in Germany, England, New Zealand, and in the U. S. The format of wave clouds, ice clouds, air currents, called rotors and clear air turbulence are explain Diagramatic and photographic illustrations of various types of lee waves and wave clouds included. Also included is a copy of a photograph of wave clouds "Une pile d'assiettes" neatly stacked they resemble a pile of plates. These photos appeared near the maritime A northeast of Marseilles. *Subject Headings:* **1. Lee waves 2. Rotor currents 3. Clear turbulence 4. Wave clouds.**—*E.Z.S.*

AQUEOUS VAPOR AND HYDROMETEORS (551.57)

HUMIDITY (551.571)

See also: **Air temp. and humidity gradients meas. by psychrometers** (Konstantinov, Golubev), 12.11–182.

12.11–311 551.511.2:551.571

Grigor'eva, A. S., **Perenos vodianogo para nad Evropeiskoĭ territoreĭ SSSR v razlich mesiatsy.** [Water vapor transport over the European U.S.S.R. during the different mont *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 89:3–20, **1959.** 7 figs., ta ref. **DLC**—Mean and turbulent transport of atmospheric water vapor for January and 1951 and 1952 were calculated for 25 points between 48 and 68°N lat. and 20 to 60°E l in the U.S.S.R. The calculations were made for the surface of the earth, 850, 700 and 500 surfaces and in a column of air from the earth's surface to the 500 mb surface. Real winds used in the computation; gradient winds, temperatures and dewpoints from which abs humidity was computed were used only when no wind data were available. From the ponents of wind velocity and absolute humidity at different levels the total mean and moisture flux was determined and the turbulent flux was obtained as a residual term. equation for determining total zonal (meridional) moisture flux is presented and the chara istics of the circulation, moisture distribution and wind velocity in January and July, geographical distribution of moisture flux at different levels, the total and turbulent and moisture flux are discussed with the aid of numerical data and isoline maps of Euro U.S.S.R. The turbulent moisture flux in an atmospheric column from the surface of the to the 500 mb surface constitutes about 20% of the total moisture flux. The role of turbulent moisture flux in the general zonal moisture flux is slight (5–10%). The moisture flux can be computed with satisfactory accuracy from the mean data without ta into account turbulent moisture flux. The meridional turbulent moisture flux in the meridional flux is considerable, amounting to 25–36%. When the meridional moisture is calculated the considerable portion of the moisture vapor, transported at the expen individual vertices is not considered so that a considerable error results in the comput of moisture flux. *Subject Headings:* **1. Water vapor transport 2. Zonal moisture flux 3. I pean U.S.S.R.**—*I.L.D.*

12.11–312 551.571:581.19:634.9:5

van Eimern, J., **Erfahrungen bei der Messung der Benetzungsdauer von Blätter pflanzenpathologische Zwecke.** [Measurements of the duration of moisture on leave purposes of plant pathology.] *Wetter und Leben*, Vienna, 11(8/10):131–138, **1959.** 2 2 tables, 7 refs. **DWB**—Results of the measurements indicate specifically that fungu other infections begin and spread during the period when leaves remain moist. The du of the moisture is related to the temp. Spraying should be done after rain ceases. *Headings:* **1. Leaf moisture measurements 2. Plant pathology.**—*E.Z.S.*

12.11–313 551.571.2/3(438)

*Wierzbicki, Zenon, **Niedosyt wilgotnósci powietrza w Polsce.** [Air saturation deficit in Poland.] *Acta Geophysica Polonica*, Warsaw, 7(3/4):430–441, **1959.** 6 figs., 2 tables, 10 refs., 5 eqs. English summary p. 439–441. **DWB, DLC**—This study is based on observational results from 106 meteorological stations in which the values of saturation deficit were determined daily during the period 1949–1953. Comparison of saturation deficit values for a period of 5 years with those of a 10-year period for several stations in different climatic subzones showed only slight differences, which proves the stability of this element. A table presents the annual course of atmospheric saturation deficit for different climatic regions of Poland. Several maps show distribution of the diurnal sums of atmospheric saturation deficit for the annual and hydrological winter and summer periods. Author introduces a semi-empirical formula for evaporation from a free water surface, taking into account variations in saturation deficit during a full day. *Subject Headings:* **1. Air saturation deficit 2. Saturation deficit 3. Poland.**—*E.Z.S.*

12.11–314 551.587:551.571.31

Hastenrath, S. (*Köln*), **Der Tagesgang des Dampfdrucks in verschiedenen Höhenlagen der Alpen bei sommerlichem und winterlichem Hochdruckwetter.** [The daily behavior of vapor pressure at various elevations in the Alps during summer and winter high pressure weather.] *Meteorologische Rundschau*, Berlin, 12(6):173–176, Nov./Dec. **1959.** 2 figs., 8 refs. German summary p. 173. **DWB, DLC**—For various Alpine stations in Austria situated at different altitudes, the author determined from temperature and relative humidity the daily variation of vapor pressure during summer and winter high pressure weather. During summer convection brought about in lower altitudes a decrease in vapor pressure at noon and the stations situated at higher altitudes had a single peak daily variation. In winter the noon minimum was lacking at low altitude stations; in connection with a warming up there appeared at night a secondary maximum. A two peak daily variation, just as at the lower altitude stations in summer, manifested itself at higher altitude stations above the winter temperature inversion since the push of cold air from lower levels was lacking. Owing to its position, the vapor pressure variation of the Zugspitze is dominated by the vapor pressure variation of the free atmosphere. *Subject Headings:* **1. Vapor pressure variations 2. Austrian Alps.**—*Transl. of author's abstract (I.L.D.).*

EVAPORATION AND EVAPOTRANSPIRATION (551.573)

See also: **Evapotrans. of forest stands on clayey soils with high groundwater table** (Holstener-Jørgensen), 12.11–361.

12.11–315 551.501:551.573:581.11

Elias Castillo, Francisco (*Ingeniero Agrónomo Sección de Hidráulica Agrícola*), **Calculo de la evapotranspiracion potencial mensual en "El Encin" (agosto 1957–diciembre 1959) por el metodo de Penman.** [Calculation of the monthly potential evapotranspiration in "El Encin," Aug. 1957–Dec. 1959, by the Penman method.] *Spain. Instituto Nacional de Investigaciones Agronomicas, Boletín*, 20(42):93–111, June **1960.** fig., table, 7 graphs, 12 refs., 4 eqs. English and French summaries p. 110. **DLC**—Evapotranspiration rates are calculated using Penman's formula. The use of the formula is demonstrated—monthly values of evaporation-transpiration have been computed for a small area. Calculations for heat balance and diffusion of water vapor are developed with reference to BOWEN, BRUNT, DALTON, etc. *Subject Headings:* **1. Evapotranspiration 2. Potential evapotranspiration calculations 3. El Encin, Spain.**—*E.Z.S.*

12.11–316 551.501:551.573:581.11:633.1

†*Gerber, John F. and Decker, Wayne L., **Comparison of evapotranspiration as estimated by the heat budget and measured by the water balance from a corn field.** Missouri. Univ. Dept. of Soils, Contract Cwb-9563, Final Report, June 1, **1960.** 111 p. 13 figs., 10 tables, 14 refs., numerous eqs. **DWB** (M73 G362co)—The paper discusses the factors responsible

for the loss of water from plant, water and soil surfaces. It leads to a study of the ener balance of the earth's surface. The amount of water used is related to the distribution the energy. For the liquid to change into vapor, energy must be supplied to increase t kinetic energy of the water molecule. The authors explain the problem through an experim conducted at the Midwest Claypan Experiment Farm near McCredie, Mo. The details the experiment and the resulting data are given *in extenso*. Penman's model gives hig correlated results but it fails to estimate evapotranspiration from the heat budget as compa to the water balance with dry soil. Potential evapotranspiration is said to be useless from view point of efficient agronomic use. *Subject Headings:* **1. Evapotranspiration studies 2. C field water balance 3. Mc Credie, Mo.**—*A.H.K.*

12.11–317 551.501:551.

Kohler, Max A., **Computation of evaporation and evapotranspiration from meteorologi observations.** Wash., D. C., U. S. Weather Bureau, **1957.** 10 p. 7 figs., 16 refs. Mim **DWB** (M73 K79co)—Observations were carried out at Lake Hefner, Okla. (1950–51), L Mead, Ariz.-Nev. and Felt Lake, Calif. (1954–55). These experiments indicate that estima of reservoir evaporation can be made with sufficient precision from pan evaporation and rela meteorological data. Procedures, derived for estimating pan and Lake evaporation fr observations of solar radiation, air temperature, dewpoint and wind are mentioned. procedure for estimating soil moisture deficiency day-by-day from precipitation, runoff computed free-water evaporation for use in the preparation of river forecasts is reporte detail. *Subject Headings:* **1. Evapotranspiration computation 2. Evaporation from reserv 3. Lake Hefner, Okla. 4. Lake Mead, Ariz.-Nev. 5. Felt Lake, Calif.**—*I.S.*

12.11–318 551.573:551.

*†Konstantinov, A. R.; Fedorova, T. G. and Golubev, V. S., **Vliianie razlichnykh fakto na pokazaniia vodnykh isparitelei, ustanovlennykh na sushe.** [Influence of various fac on the readings of evaporation tanks placed in the ground.] *Leningrad. Gosudarstven Gidrologicheskiĭ Institut, Trudy*, No. 76:67–111, **1960.** 17 figs., 21 tables, 36 refs. **DW** The results of experimental studies on water evaporation carried out during a 10 year pe at the Valdai Hydrometeorological Research Laboratory are presented. The contents of comprehensive study include the following: location and general meteorological characteri of the region where the experimental plot is situated; observational procedure for determina of evaporation of water; influence of the area and depth of insertion of the evaporimeter in ground upon the intensity of evaporation from a water surface; the results of simultan investigations of evaporimeters of class A and GGI-3000 including influence of dimensions method of installation of the evaporimeters upon their readings, influence of different soi which the evaporimeter is installed; the conversion coefficients of these two types of e orimeters and the stabilities of these coefficients under different natural conditions; and effect upon the evaporimeter exerted by installation in the ground or on surface of the the effect of the structural mounting of evaporimeters, of constitution of the water such a presence of an oil film on the surface, salinity, etc. and of meteorological conditions upon amount of evaporation from a water surface. Extensive data on evaporation rate and relevant equations for calculating evaporation, etc., are presented. *Subject Headings:* **1. Ev ration rate 2. Evaporimeter comparison 3. Evaporation measurement techniques 4. Va U.S.S.R.**—*I.L.D.*

12.11–319 551.573:551.579.2

§Simojoki, H. (*Finnish Hydrolog. Off., Helsinki*), **Evaporation during the spring snow season.** *Geophysica*, Helsinki, 7(1):43–49, **1959.** 4 figs., 2 tables, ref. **DWB, DL** description of the meteorological conditions in which evaporation occurs during the s snowmelt season in the Lylykoski and Alaluosta drainage areas, Finland. Conside evaporation occurred during the "N" and "NW Lage": a dry northerly air current, gene bright weather and a relatively low air temperature. Solar radiation warms the surface c snow and produces a current of humidity directed upwards. The situation is probably si to that mentioned by SVERDRUP (1936) concerning evaporation in Arctic regions. *S Headings:* **1. Evaporation of snow 2. Snow melt 3. Finland.**—*E.Z.S.*

12.11–320 551.573:551.481.1(94)

†Webb, E. K. (*C. S. I. R. O., Melbourne*), **An investigation of the evaporation from Lake Eucumbene.** *Australia. Commonwealth Scientific and Industrial Research Organization. Div. of Meteorological Physics, Technical Paper*, No. 10, **1960.** 75 p. 9 figs., 12 tables, 32 refs., 2 eqs. **DWB**—This paper describes an investigation of the evaporation from Lake Eucumbene, the largest storage of the Snowy Mountains hydroelectric scheme. The object has been to investigate the feasibility of routine evaluation of the evaporation. The experimental work on the lake was carried out over the five months from December 1958 to April 1959. The investigation has included the following aspects: (1) The variability of water temperature and meteorological factors over the lake surface has been subjected to statistical study. (2) The evaporation has been estimated on a continuous basis by the bulk aerodynamic method and by the heat budget method, using autographic records from instruments mounted on five masts set off-shore at different positions around the lake. (3) On a number of occasions, evaporation has been estimated also from the vertical profiles of wind and humidity measured from a raft. As a result of the investigation it is concluded that the evaporation may be evaluated operationally using the bulk aerodynamic method. The latter is considerably simpler than the heat budget and profile methods, since it calls for the recording of no more than water temperature and standard meteorological quantities. It is found that the relevant quantities are satisfactorily uniform over the lake, so that a small number of sampling points will suffice. A major purpose of the associated heat budget and profile measurements was to determine the value of the numerical coefficient which is inherent in the bulk aerodynamic formula. The results confirm the Lake Hefner, U. S., value to within the experimental accuracy (10%). Apart from the accuracy of the formula, it is concluded that the experimental standard error in assessing weekly or monthly evaporation will be less than 10% if a thermohygrograph is employed to record vapour pressure, or 5% if an instrument free from systematic error is employed. In the course of sampling investigations, it is found that on the average for air traveling about 2 km over the lake, the vapor pressure at 4 m height increases by approx. 0.25 mb, while the wind speed at 8 m increases by about 5%. Profile measurements in winds ranging from 2 to 5½ m/sec (at 2 m height) indicate values of the roughness parameter z_0 lying between 0.1 and 0.4 cm, tending to concentrate near 0.4 cm at winds near the top of that range. *Subject Headings:* **1. Evaporation from lakes 2. Evaporation measurement techniques 3. Lake Eucumbene, Australia.**—*Author's abstract.*

CONDENSATION (551.574)

12.11–321 551.574.1:551.575.1

Mukherjee, Asoke Kumar (*Met. Off., Barrackpore*), **Removal of soluble gaseous air pollutants by fog.** *Indian Journal of Meteorology and Geophysics*, New Delhi, 11(3):318–319, July **1960.** 3 refs., 10 eqs. **DWB, DLC**—It is likely that settling fog particles remove air pollutants but the trajectory of a settling fog droplet being uncertain, no quantitative equation of such a process can be developed. However, soluble gaseous pollutants dissolve rather because of their kinetic motion than due to sweeping out by fog droplets. This brief note, therefore, is restricted to a theoretical consideration of the removal of soluble gaseous pollutants by fog droplets. *Subject Headings:* **1. Gaseous pollutant removal 2. Scavenging by fog.**—*I.S.*

12.11–322 551.574.42(47)

*Rudneva, A. V., **Povtoriaemost' i intensivnost' gololedno-izmorozevykh iavlenii na territorii SSSR.** [Frequency and intensity of glaze and rime phenomena in the U.S.S.R.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 75:3–31, **1957.** 18 figs., 7 tables, 9 refs. **DLC**—The author asserts that this study of the frequency and intensity of the occurrence of glaze rime is the most thorough one that has been made hitherto for the U.S.S.R. Particular attention has been given to the mountain and northern region of the Asian U.S.S.R. The dependence of the distribution of the number of days with glaze and rime upon altitude in different regions of the U.S.S.R. is examined, and with the aid of numerical data, graphs and maps the author presents a detailed analysis of the distribution of the number of days with glaze, the maximum magnitude of the large diameter of deposition of glaze and rime on wires 2 m above the ground, the distribution of glaze and rime on the European U.S.S.R.

in the Ural range, in the Polar Urals, in the Central Urals, in the southern Urals, in the Ca casus, in the Crimea, etc. Also, specific synoptic situations associated with incidence of gla and rime are presented. *Subject Headings:* **1. Glaze frequencies 2. Rime frequenci 3. Synoptic conditions for glaze and rime formation 4. U.S.S.R.**—*I.L.D.*

12.11–323 551.578.7 551.574.7:629.

McDonald, James E. (*Univ. Arizona*), **The ice-fall problem.** *Weatherwise*, Bosto 13(3):110–114; 132, June **1960.** 2 figs., table. **DWB**—The fall of sizeable pieces of ice fr the sky has not been satisfactorily explained. Icing of aircraft waste water may play important part in such phenomena but several of the ice falls noted were not associated w aircraft falls. An annotated list of ice falls since February 18, 1953 is given. *Subject Headin* **1. Ice-falls 2. Icing of aircraft waste water.**—*E.Z.S.*

FOG (551.575)

See also: **Soluble gaseous air pollutants removal by fog** (Mukherjee), 12.11–321; **Drop size distr. and water in winter fog, Delhi** (Srivastava, Kapoor), 12.11–350; **Visibility deterioration in fog, Merryfield, Eng.** (Tinney), 12.11–383.

12.11–324 551.575.1(4

*Kats, L. I. and Piatnitskiĭ, A. S., **Nekotorye dannye o tumanakh v raĭone AMSG Ki** [Some data on fog in the region of the AMSG (Air Weather Station), Kiev.] *Kiev. Ukra Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 7:153–158, **1957.** 2 fi 10 tables. **DWB**—Present article is an attempt to make certain conditions observed at time of fog formation in the Kiev region. The following characteristics of fog are analyz frequency of fog in a year and in a month (tabulated); intensities of fog as indicated by h zontal visibility and its frequency (in table); duration of fog of various intensities; the freque of different durations at different seasons of the year; frequency of minimum visibility; of in time and seasons; of fog under different wind velocities and directions; relation of frequency to air temperature and humidity; frequency of relative humidity of air at the t of fog. The investigation of all above mentioned characteristics are illustrated with tab A diagram of mean yearly fog and a graph of relation of temperature to humidity at moment of fog appearance are included. *Subject Headings:* **1. Fog data 2. Kiev, Ukrain S.S.R.**—*B.J.G.*

12.11–325 551.575.1:551.576.1:551.52

Saunders, W. E., **The clearance of water fog following the arrival of a cloud sheet du the night.** *Meteorological Magazine*, London, 89(1050):8–10, Jan. **1960.** fig., table, 3 r **DWB, DLC**—This paper, discussing the clearance or persistence of water fog on occasi when a cloud sheet is expected to arrive, is a continuation of a previous paper in which servations concerning the effects produced by a sheet of cloud spreading over an exis radiation fog at Exeter Airport were described. The present paper separates the case which fog cleared from those in which it failed to do so with a view to provide a basis forecasting. The parameters chiefly considered are cloud height and the nature and stat ground, since both influence the temperature significantly. Relation of fog clearance to cl height and soil-to-air temperature gradient is graphically represented. It is concluded that continuous sheets of stratocumulus cloud will cause fog clearance unless initially the ground air temperature difference is small. *Subject Headings:* **1. Fog clearance 2. Stratocum cloud effects on fog 3. Soil-to-air temperature gradient.**—*I.S.*

12.11–326 551.553:551.575.3(

Buma, T. J. (*Netherlands*), **Fog at Leeuwarden, the Netherlands.** *Meteorological M zine*, London, 89(1055):161–167, June **1960.** 3 figs., 3 tables, 5 refs., eqs. **DWB, DLC**— diurnal variation of fog during a period of eight years at Leeuwarden is investigated. found that in general the diurnal and seasonal variation is similar to that found by N. E. D concerning London Airport. The connection of fog with the surface wind direction is exam and it is shown that the probability of fog is relatively high in the case of winds from a south

direction, partly due to the influence of the water areas south of the station. *Subject Headings:* **1. Diurnal fog variations 2. Fog-wind direction relationships 3. Leeuwarden, Netherlands.**—*Author's abstract.*

CLOUDS (551.576)

See also: **Long wave radiation balance, Arctic** (Marshunova), 12.11–49; **Fog clearance following cloud sheet** (Saunders), 12.11–325; **Sferics from intracloud lightning strokes** (Tepley), 12.11–400.

12.11–327 551.501.81:551.576:551.577:551.515.4

Pietka, Zenon, **O zastosowaniu metod radiolokacyjnych do pomiarów opadów i obserwacji nad chmurami i burzami.** [Application of radar methods to precipitation measurements and to cloud and thunderstorm observation.] *Przeglad Geofizyczny*, Warsaw, 4(3/4):247–262, **1959.** 14 figs., 18 refs., 23 eqs. **DWB, DLC**—A highly technical paper in which the author successively discusses, on the basis of foreign and Polish literature, the following questions: 1) physical bases of echo formation from precipitation; 2) estimation of impulse intensity reflected from precipitation; 3) quantitative measurement of precipitation; 4) techniques of measuring the intensity of precipitation in a wide area and 5) qualitative investigation of rain- and non-rain clouds. *Subject Headings:* **1. Radar precipitation measurement techniques 2. Radar observation of clouds 3. Radar observation of thunderstorms.**—*A.M.P.*

12.11–328 551.576.2

Seshadri, T. N., **Simplified sky component equations for a C.I.E. Standard Overcast Sky.** *Current Science*, Bangalore, 29(5):174–175, May **1960.** fig., tables, 5 eqs.—Describes the derivation of a sky component equation for a vertical rectangular opening. It is possible to reduce the equations to forms simple enough for use in direct calculations. Equations for vertical openings for components in the horizontal plane are given in this note. *Subject Heading:* **1. Sky component equations.**—*A.H.K.*

12.11–329 551.576.4:551.551.5:551.553.21

*Venkateswara Rao, D. (*Met. Off., Madras*), **Cloud heights and turbulence in monsoon season in South Asia.** (In: Symposium on Monsoons of the World, New Delhi, Feb. 19–21, 1958, [**Proceedings**], New Delhi, **1960.** p. 182–184. fig., 2 tables, ref.) **DWB** (M53.21 S989sy)—Analysis of turbulence reported during the period 1952 and 1953 by pilots of Comet Jet Airliner fleet at various meteorological offices in South Asia has been made. Attention has also been drawn to an earlier paper of the author (Rao, 1955) about the investigation of all debriefing reports collected from Comet Jet Airliner pilots during the same period on cloud heights and thickness. *Subject Headings:* **1. Cloud heights 2. Atmospheric turbulence 3. Monsoon season 4. South Asia.**—*Author's abstract.*

PRECIPITATION (551.577)

See also: **Rainfall effects on soil erosion, Banyuls, France, 1959** (Michel), 12.11–137; **Rain induced high water level, S. Danube** (Kern), 12.11–318; **Chem. of air, soil and plants** (Lauscher), 12.11–187; **500 mb height pattern variation in Bai-u** (Yamamoto), 12.11–220; **Gen. circ. and dry periods, Slovenia** (Berko), 12.11–221; **Precip. meas. and cloud, thunderstorm obs. by radar** (Pietka), 12.11–327; **Isoline charts of annual precip. norms, China** (Yeh, Lo), 12.11–373.

12.11–330 551.509.59:551.515.1:551.501.81:551.577.1

Kotov, N. F., **Ispol'zovanie rezul'tatov radiolokatsionnykh issledovanii osadkov dlia uluchsheniia raboty seti stantsii shtormopoveshcheniia.** [Use of the results of radar precipitation studies in improving the work of the storm warning network.] *Moscow. Tsentral'naia Aerologicheskaia Observatoriia, Trudy*, No. 20, **1958.** p. 17–25. 5 figs. **DWB**—Radar storm warning provides for the discovery of the centers of showers and thunderstorms. At the same time the area, form, intensity and the character of movement is also given. The radar characteristics of synoptic phenomena are described and illustrated by 13 photos of radar images.

The thunderstorm conditions of the showers and characteristics of shower occurrence in a observed region are discussed separately. In conclusion, the code system in warnings discussed and a sample of code meanings is given. *Subject Headings:* **1. Storm warning no works 2. Radar observation of storms 3. Radar observation of precipitation.**—*B.J.G.*

12.11–331 551.556.4:551.464:546.13 551.577.13:546.

Woodcock, Alfred H. (*Woods Hole Oceanog. Inst., Mass.*), **Chloride carried inland maritime winds compared to chloride found in rain and river waters (summary only).** *Amer can Geophysical Union, Geophysical Monograph*, No. 3:123, **1959. DWB, DLC**—Averages over 250 measurements of the size and number of sea-salt particles in marine air are given a function of altitude and wind force. These quantities of sea salt are then used to estimate t annual amounts of chloride transported inland. Comparisons of these airborne salts a made with the annual amounts of chloride brought down by rains and those dissolved in t rivers. Differences in the amounts of salt in the subcloud layer over the sea, and the mixi of this layer as it flows inland, are shown to account for a large part of the decrease in t chlorinity of rains with distance inland. Measurements of rates of accumulation of salt horizontal plates suggested that fallout of the particles will also be a factor in decreasing salt concentration in the air over land. *Subject Headings:* **1. Sea salt nuclei 2. Nuclei di tribution over land 3. Chlorinity of rainwater.**—*Author's abstract.*

12.11–332 551.577.2:519.24(

*Shaw, Robert H.; Barger, Gerald L. and Dale, Robert F., **Precipitation probabilities the North Central States.** *Missouri. Agricultural Experiment Station, Bulletin*, 753, Ju **1960.** 72 p. 57 figs., table, 7 refs. **DWB** (M77.2/77 S535pr)—This report gives an acco of the precipitation probabilities in the north central states of the U. S. The one week prec tation is maximum in April–June and minimum in the winter. The two week precipitati shows a west to east pattern. The three week precipitation is maximum in April–June a minimum in winter. The probabilities can be used in planning agricultural operatio Many figures and tables are given. *Subject Headings:* **1. Precipitation probabilities 2. No Central United States.**—*A.H.K.*

12.11–333 551.513.2:551.515.1:551.577.2(43

*Rákóczi, Magdolna (*Wágner*), **A csapadék eloszlása Magyarországon meridion áramlásu ciklonális helyzetekben.** [Precipitation distribution in Hungary during cyclo situations with meridional circulation.] *Időjárás*, Budapest, 64(2):96–102, March/A **1960.** 12 figs., 2 tables, 2 refs. Hungarian and German summaries p. 96. **DLC**— periodical and regional distribution of precipitation during cyclonic conditions of meridi circulation are examined using data for 96 stations for a period of 18 years. The aver precipitation during northerly cold front conditions is largest in summer and smallest in win while most precipitation occurs in the autumn with southerly cyclonic warm front conditi Considering regional distribution, the maximum precipitation occurs in the region beyond Tisza River during northerly cyclonic condition while in the winter during the south cyclones the maximum of precipitation is found in the southwest regions of Trans-Danu A more detailed analysis is presented on the precipitation distribution for the regions of Bak and Matra Mountains. *Subject Headings:* **1. Precipitation distribution 2. Seasonal precip tion distribution 3. Cyclone circulation 4. Meridional circulation 5. Hungary.**—*Tra of author's abstract (O.T.).*

12.11–334 551.577.36/7:551.582

*†Yoshino, Masatoshi (*Tokyo Kyoiku Univ.*), **The distribution of maximum observed rai and the characteristics of depth-duration and intensity duration curves in Japan.** *Mete logical Society of Japan, Tokyo, Journal*, Ser. 2, 38(1):27–46, Feb. **1960.** 13 figs., 5 tab 29 refs., 12 eqs. In Japanese; English summary p. 27. **DWB, DLC**—According to off observation, the maximum rainfall recorded in Japan is 55.9 mm in 10 min., 87.9 mm in 30 m 157.0 mm in 1 hr, 415.3 mm in 6 hrs, 844.5 mm in 10 hrs, 1,109 mm in 24 hrs, 3,462 mm month and 10,216 mm in 1 year. Comparing these amounts with world records reporte

ENNINGS (1950), it is noticed that maximum rainfall in Japan is comparable only to world igures in the 10 to 24 hour duration. This is thought to be because polar fronts or tropical yclones in Japan and adjacent areas are stronger in that same period, while convectional rain, uch as thunder storms of short duration, or continuous rain, such as orographic rainfall under nonsoonal conditions, are weaker than in other parts of the world. In addition, distribution aps of observed maximum rainfall within 10 min., 1 hr, 6 hrs and 24 hrs were drawn, and the istribution patterns were considered in connection with their causes. The constants, k and n, or an experimental equation of the depth-duration curve, $R=kt^n$, where t is time (in minutes) nd R, rainfall amount (in mm), were then calculated. As for the rainfall amount, R, the ean values obtained from the 1st to the 5th ranking in the official records of the Japan Meteorological Agency from 1941 to 1950, as observed every 10, 20, and 30 minutes and every , 3, 6, 18, 24, and 36 hrs for each of the 109 stations in Japan, were used. Separating the ime periods into those between 10 minutes and 1 hour and those between 6 and 36 hours, it as shown that the k and n values exhibited a wide range according to geographical regions nd the above-mentioned time periods. These facts are shown in the accompanying figures nd tables. Finally, the constants, b, k, and n, for an experimental equation for the intensity-uration curve, $i=k/(t+b)^n$, where t is time (in minutes) and i, the rainfall intensity (in mm per inute) were obtained by calculating the intensity values by the same method as is described bove for the mean rainfall values. The distribution of b, k, and n values revealed marked ocalization as is shown in the figures attached. The values decrease with distance from the ea coast in central Japan, and are generally smaller on mountain tops than at the bottoms. *ubject Headings:* **1. Rainfall intensity duration frequencies 2. Rainfall-depth-duration urves 3. Japan.**—*Author's abstract.*

12.11–335 551.577.21:519.241.1

Kotz, S. (*Israel Met. Service*) and Neumann, J. (*Hebrew Univ., Jerusalem*), **Autocorrelation n precipitation amounts.** *Journal of Meteorology*, Boston, 16(6):683–685, Dec. **1959.** fig., refs., 12 eqs. **DWB, DLC**—The authors consider the following problem: given the auto-rrelation in amounts of precip. for non-overlapping periods of a fixed length, what auto-rrelation may be expected in the precip. amounts for non-overlapping periods of greater ngth. For example if the periods of fixed length or days what autocorrelation is to be xpected in the amounts of precip. such as weeks, months or years? The statistical examina-on of the problem is based upon the construction of a probability model for the occurrence precip. amounts. The 24-hr day period is chosen as the starting point. The main features this model are as follows: the daily amounts of precip. like an identically distributed and rrelated random variation having the same mean and variance; and the autocorrelation tween the daily amounts of precipitation is a sole function of the separation in time between e days concerned. The procedure for autocorrelations in amounts of precip. for periods of days is demonstrated. It is concluded that the autocorrelation in precip. data for periods some length relative to one day is negligible. The correctness of this inference is demon-rated by serial correlation coefficients lags 0 to 20, in the amount precip. data for Jerusalem 860–1953. Nine of the first 20 coefficients reached the value of 0.207 though the coefficient r the 11-year lag came close to it. *Subject Headings:* **1. Precipitation amount 2. Auto-rrelation in precipitation amounts 3. Statistics.**—*I.L.D.*

12.11–336 551.577.36(435.3)

Wehner, Hans, **Häufigkeitsuntersuchung der Niederschlagszeiten und -intensitäten.** [Frequency investigations of precipitation times and intensities.] *Zeitschrift für Meteorologie*, erlin, 14(4):94–98, April **1960.** 2 figs., 3 tables, 5 refs. German and English summaries 94. **DWB, DLC**—For agriculture, building projects and water resource development in ddition to the usual precipitation heights and the number of days with selected precipitation mounts information on the time distribution and intensity is required. Observational data the Dresden-Wahnsdorf meteorological station are taken to submit frequencies of precipita-on durations and intensities of the 1946–55 period. Diurnal intensities of 40 m^3/km^2 min ainly occurred in the summer half of the year. Further, the relation of precipitation in-nsities to the typical large-scale pressure patterns (Grosswetterlage) is investigated. Chief

contributor to the number of heavy rainfalls is shown to be the south type circulation. *Subje*
Headings: **1. Precipitation duration intensity frequencies 2. Large scale pressure patter**
3. Heavy rainfall distribution 4. Dresden-Wahnsdorf, Germany.—*Author's abstract.*

12.11–337 551.577.36(521.8

*Yoshimochi, A., **Decadic precipitation at Hiroshima.** *Journal of Meteorological Researc*
Tokyo, 11(10):880–883, **1959.** 2 figs., 2 tables, 6 refs. In Japanese. **DWB, DLC**—Usi
data from the period 1889 to 1950 and partly from 1951 to 1956, the frequency distribution
decadal precipitation was calculated in order to compare the theoretical value with the practic
observed value with the formula: $M=pa$, $D=pa^2$, where M=the mean of observed valu
D=divergence; p=parameter for the characteristic of distribution; a=the same as p. It w
concluded that: 1) the first part of March, July, and October are shown as a normal type a
the rest of decadal precipitation could be ascribed to random factors; 2) the maximum pro
ability of heavy rain, according to the calculation of p and a, is found in the middle of Ju
and July and the first part of August, but it was less in comparison to Bai-u in Octob
3) deviation estimated by the quarter method was larger in July and September and the lat
part of April. *Subject Headings:* **1. Precipitation frequency distribution 2. Frequency**
decadic precipitation 3. Japan.—*K.C.*

12.11–338 551.577.3:523.

Jenkinson, A. F. (*Met. Office, Stanmore, Eng.*), [**Comments on**] **E. G. Bowen: Relati**
between rainfall and meteor showers, and [**Reply by**] **Bowen.** *Journal of Meteorolo*
Boston, 17(3):376–377, June **1960.** (For abstract on original article, *see* 7.9–204, Sept. 19
Met. Abs.) **DWB, DLC**—The author disagrees with BOWEN's assertions that the mean cu
of daily rainfall data for seven areas shows the properties of the individual areas; in fact,
points out that if separate mean curves are drawn for the northern and southern hemisphe
these are found to be quite dissimilar. It is pointed out that in obtaining the mean curve
data for the British Isles are considerably overweighted. The results of equal weight
obtained by scaling the data to give all the areas the same range of variation are presen
The regimes of the northern and southern hemispheres are very much opposed to one anot
a fact completely at variance with BOWEN's assertion. In reply, BOWEN refuses to conti
the argument and accuses meteorologists of evasiveness on the problem of extraterrest
influences and demands the publication of daily rainfall figures for 100 or 200 representa
stations for a period of about 50 yrs before continuing the argument further. *Subject Headi*
1. Rainfall—meteor shower relationships 2. Extraterrestrial influences on rainfall.—*I.L.*

12.11–339 551.577.31(541

Dhar, O. N. (*Met. Office, New Delhi*), **The diurnal variation of rainfall at Barahksh**
and Kathmandu during monsoon months. *Indian Journal of Meteorology and Geophys*
New Delhi, 11(2):153–156, April **1960.** 4 figs., 3 tables, ref. **DWB, DLC**—The self-recor
rain gage data during monsoon months collected at Barahkshetra and Kathmandu in N
for a 13 year period (1947–59) are reported and discussed. All hourly rainfall amounts of
in. or more for the four monsoon months and the occasions of precipitation in each hour
tabulated. The hourly values of rainfall and precipitation occurrences for different mo
are also graphically represented. Data regarding highest rainfall ever recorded in any c
hour are also presented in tabular form. *Subject Headings:* **1. Diurnal rainfall variat**
2. Record rainfall 3. Monsoon rainfall 4. Barahkshetra, Nepal 5. Katmandu, Nepal.—

12.11–340 551.506.3:551.577.37(

*Glasspoole, John, **Heavy falls on rainfall days, 1876–1955.** *Great Britain. Meteorolo*
Office. Climatological Services, Hydrological Memoranda, No. 2, **1958.** 13 p. Almost ent
tables. Mimeo. **DWB** (M78.1 G786hy)—This hydrological memorandum consists ent
of tabulated data on heavy rainfall days in various parts of Britain from 1876 to 1955.
Cumberland and Westmoreland and in the case of the falls of Aug. 26, 1912, June 28, 1
Aug. 12, 1948 and June 18, 1955 only falls reaching 5.00 in. are included and in Glamor
Brecon, Merioneth, Carnarvon, Argyll and Inverness only falls reaching 4.50 in. In cou
where no fall of 4 in. has been recorded, the largest fall is given where that reached 3 in. I

case of counties with no entry, the largest fall on record is less than 3 in. The rainfall day covers the 24 hrs from 9 a.m. on the day entry. *Subject Headings:* **1. Heavy rainfall data 2. Long period records 3. Great Britain.**—*E.Z.S.*

12.11–341 551.577.37(669)

*Nigeria. Meteorological Service, **Heaviest daily rainfall.** *Nigeria. Meteorological Service, Meteorological Note*, No. 10, Dec. **1960.** tables, 3 refs. **DWB**—Tables give the heaviest observed daily rainfall during each month of the year for 50 stations in Nigeria. *Subject Headings:* **1. Record daily rainfall 2. Nigeria.**—*R.B.*

12.11–342 551.577.37:551.515.8(425.1/2)

Parrey, G. E., **Unexpected rainfall at Watnall, May 18, 1958.** *Meteorological Magazine*, London, 89(1052):71–75, March **1960.** 6 figs., ref. **DWB, DLC**—Describes a typical unexpected rainfall in certain areas of England. On May 18, 1958, Nottinghamshire, Derbyshire and the surrounding areas registered rainfall unexpectedly. At Watnall 0.32″ of rainfall was recorded. The windward slopes of the regional hills showed little rainfall. The windflow was between 280° and 290°. *Subject Headings:* **1. Warm front effects on rain formation 2. Watnall, Eng.**—*A.H.K.*

12.11–343 551.577.38(948)

*Bond, H. G. (*Bur. of Meteorology, Australia*), **Drought of 1951–52 in Northern Australia.** (In: Symposium on Monsoons of the World, New Delhi, Feb. 19–21, 1958, [**Proceedings**]. New Delhi, **1960.** p. 215–222. 5 figs., 2 tables.) **DWB** (M53.21 S989sy)—A description is given of the severe drought over Northern Australia of 1951–52. It was caused by the failure of the northwest monsoon and the low incidence of related tropical cyclone activity. Reasons for the failure of the monsoon are investigated. To begin with, the north Pacific typhoon season of 1951 was unusually prolonged, retarding the early development of monsoon wind streams southward from the equator. It is shown that a pressure gradient becomes established between Southeast Asia and Northern Australia, directed towards the latter with maximum development in January and February. There appears to be an approximate lag correlation between a gradient in excess of 6 mb and monsoonal activity in the Northern Australia area. Results indicate that seasonal conditions in Northern Australia are bound up with the balance of meridional airflow which is in turn related to the anticyclonic circulations in the temperate zones of both hemispheres. *Subject Headings:* **1. Drought, Northern Australia (1951–52) 2. Monsoon failure 3. Australia.**—*Author's abstract.*

12.11–344 551.501:551.577.38(773):681.177

Changnon, Stanley A., Jr. (*Ill. State Water Survey*), **A method for determining dry-period probabilities as applied to Illinois.** *Meteorological Monographs*, Boston, 4(22):44–49, May **1960.** 4 figs., 4 refs. **DWB, DLC**—A method to rapidly calculate dry-period probabilities from long-term climatological records utilizing machine techniques is presented. Fifty-five years of daily rainfall records entered on IBM cards can be processed in 32 hr to give the probability for each date to occur in continuous dry periods of 1, 2, 3 days or longer. Dryness, or lack of daily rainfall, has been defined at four levels: 0.10 in., 0.25 in., 0.50 in. and 1.00 in. per calendar day with daily probabilities computed simultaneously for each level. The results of analyses, as applied to data from three widely separated locations in Illinois, reveal that significant regional and seasonal variations in probabilities for dryness exist. In general, the highest probabilities for dryness occur during the colder half-year with a secondary high in July. Lowest probabilities for dryness occur in the spring months and mid-August. Considerable fluctuation in the probability values occurs during each month, especially for the 0.10- and 0.25-in.-per-day values. *Subject Headings:* **1. Dry-period probability calculations 2. Illinois.**—*Author's abstract.*

12.11–345 551.501.45:551.577.38(436)

Sneyers, R. (*Inst. Royal Météorologique de Belgique, Uccle-Bruxelles*), **Un type de distribution discrète tronquée.** [A type of discrete truncated distribution.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, Vienna, 10(3):404–411, **1960.** table, 4 refs.,

16 eqs. French, German and English summaries p. 404. **DWB, DLC**—The statistic analysis of the distribution of droughts in Heiligenblut suggests the use of truncated theoretic distributions for its representation. A logarithmic and a negative binomial distribution which the two first terms have been suppressed give effectively good fits. *Subject Heading* **1. Drought distribution analysis 2. Statistical analysis of drought distribution 3. Heilige blut, Austria.**—*Author's abstract.*

12.11–346 551.577.51(497.

Aleksić, Radmila (*Belgrade*), **Padavine u reonu Kopaonika.** [Rainfall in the Kopaon Mountain region.] *Zagreb, Yugoslavia. Hidrometeorološki Zavod NR Hrvatske, Rasprave Prikazi*, 8(4):11–25, **1959.** 9 figs., 6 tables, 4 refs. Serbo-Croatian and English summar p. 12. **DWB**—Meteorological observations since World War II at 1710 m just below Su Rudiste (2017 m) the top of Kopaonik, the highest mountain of Serbia show the greate rainfall at condensation level which changes in the cold and warm period of the year a depends on the exposition to damp and dry winds. The distribution of rainfall is dominat by the passage of cyclones with an influence of orography. The richness of forests indica a district of damp climate situated on the boundary between the damper and dryer clima Maps, diagrams and tables illustrate and support the observations and their results. *Subj Headings:* **1. Rainfall distribution 2. Orographic influences on rainfall 3. Kopaonik Mt Yugoslavia.**—*O.T.*

12.11–347 551.577.7:546.13

Schaeffer, O. A.; Thompson, S. O. and Lark, N. L. (*all, Brookhaven Natl. Lab., La Island, N. Y.*), **Chlorine-36 radioactivity in rain.** *Journal of Geophysical Research*, Was D. C., 65(12):4013–4016, Dec. **1960.** 3 tables, 13 refs., eq. **DLC**—Cosmic rays and nucl explosions are adding radioactivity to the atmosphere from which it is then removed by rainf The investigation of these activities furnishes a means of obtaining new information of s nificance in geological problems as well as in the understanding of the hazards of nucl fallout. Chlorine-36 is an interesting isotope for such a study as it has a relatively lo half-life, 308,000 years, and at the same time is very soluble in water. Relatively high levels Cl^{36} activity have been found in rain. The levels are several orders of magnitude above level to be expected from cosmic-ray production. The Cl^{36} is almost surely the result neutron irradiation of sea water by nuclear explosions. *Subject Headings:* **1. Chlorine^{36} rainwater 2. Radioactive rainwater.**—*Authors' abstract.*

RAIN, SNOW AND HAIL (551.578)

See also: **Study of snow and ice, Japan, 1958–1959,** 12.11–4; **Physics of blown sand and desert dunes** (Bagnold), 12.11–13; **Lateral displacement of snow, Antarctica** (Rusin), 12.11–58; **Radiation balance of snow surface, Antarctica** (Rusin), 12.11–59; **Snow and wind loads on buildings** (Legget, Schriever), 12.11–98; **Avalanches as a hydrologic factor** (Losev), 12.11–144; **Pre-glacial relief influence on glaciation and deglaciation** (Klimaszewski), 12.11–145; **Avalanche of the Murkar Glacier** (Kisin, Terterov), 12.11–146; **Radiation energy-snow melt relationship** (Itō), 12.11–238; **Ice-fall problem** (McDonald), 12.11–323; **Acoustical prop. of snow** (Ando, Hosokai), 12.11–401.

12.11–348 551.57

Kelkar, V. N. (*Nowrosjee Wadia College, Poona*), **Size distribution of raindrops, Pt** *Indian Journal of Meteorology and Geophysics*, Delhi, 11(4):323–330, Oct. **1960.** 5 f 2 tables, 8 refs. **DWB, DLC**—Average values of the number of raindrops per m^3 of grouped according to diameters, are given in the form of a table for various average valu precipitation rates ranging from 0.20 mm/hr to 34 mm/hr. The distribution of raindr amongst different diameter groups has been shown in the form of histograms for six diffe values of the rate of precipitation. The variations of the number of raindrops per m^3 of of particular diameter groups as well as the total number of drops of all diameters with of precipitation are shown graphically. A relation useful for correlation with radar observa is also obtained. If x is the diameter of drop in mm, the relation $Z=\Sigma^{x6}=189I^{1.35}$ mm has been obtained by the method of least squares. Radar reflectivities of rain of var

ntensities have been calculated for $\lambda = 3.2$ cm and $\lambda = 10$ cm and given in the form of a table. he median drop diameters have been obtained from the drop frequency curves and correlated ith intensity of precipitation. The relation d median $= 0.6I^{0.28}$ mm is obtained. *Subject leading:* **1. Raindrop size distribution.**—*Author's abstract.*

12.11–349 551.578.11

McDonald, James E. (*Univ. Arizona*), **An aid to computation of terminal fall velocities f spheres.** *Journal of Meteorology*, Boston, 17(4):463–465, Aug. **1960.** fig., 2 tables, 4 refs., eqs. **DWB, DLC**—If one seeks to calculate terminal velocities for water drops at high ltitudes or terminal velocities for smooth spheres of density other than that of water, a athematical difficulty arises which may be removed by using $C_dR^2 = 8W/\pi_{pm}V^2$. By plotting C_dR^2 as a function of R, we can obtain a curve that may be interpreted as relating R to $=8W/\pi_{pm}V^2$ and $V = vR/2r$. The R-Q relation is shown graphically and the basic data for the R-Q relation is tabulated. An example illustrates not only the method in question but also ne somewhat peculiar properties of the upper atmosphere considered as an aerodynamic edium. *Subject Heading:* **1. Terminal fall velocities.**—*E.Z.S.*

12.11–350 551.578.11:551.575

Srivastava, R. C. and Kapoor, R. K. (*both, Rain and Cloud Physics Res. Unit, New Delhi*), rop size distribution and liquid water in a winter fog at Delhi. *Indian Journal of Meteorology nd Geophysics*, New Delhi, 11(2):157–162, April **1960.** 3 figs., table, 5 refs. **DWB, DLC**—bservations made on 10 Dec. 1958 of persistent drifting type fog in Delhi are reported and the ze distributions of fog droplets and their variations with ageing of the fog are discussed. echnique of measurement of fog droplets is described and the details of the measurement rocess are tabulated. Three graphic representations illustrate in order, percentage of drops elonging to different size groups, based on ten observations, variations in concentration of roplets and amount of liquid water at different epochs and observation and corresponding anges in median volume diameter. *Subject Headings:* **1. Fog droplet size distribution 2. Fog roplet measurement techniques 3. Delhi, India.**—*I.S.*

12.11–351 551.578.41

Sasyo, Y. (*Met. Res. Inst., Tokyo*), **On the analysis of motion of falling paper fragment On the study of falling snow**). *Meteorological Society of Japan, Tokyo, Journal*, Ser. 2, 3(2):125–133, April **1960.** 8 figs., 3 tables, 6 eqs. In Japanese; English summary p. 125. **WB, DLC**—It is necessary to determine the hydrodynamic forces which affect falling snow snowflakes, and to look into their falling position, falling trajectory, etc. in order to study ne collision efficiency. In this paper, for preliminary investigation, the method of analysis these forces and their falling position are shown. *Subject Headings:* **1. Falling snow measure- ent 2. Snowflake collision efficiencies.**—*Author's abstract.*

12.11–352 551.578.45(74)

Ludlam, David M., **The big snow of 1836.** *Weatherwise*, Boston, 13(6):248–252, Dec. **960.** fig. **DWB, DLC**—Early in Jan. 1836, a big snowstorm hit the northeastern states of e U. S. shattering the belief that the climate of America was getting warmer each year. iladelphia received 15 in. of snow; Burlington, N. J., 20 in.; in New York, Brooklyn received in. and Manhattan, 15 in. The hills of northeast Pennsylvania were also hard hit. Onon- ga, near Syracuse, received 3 ft of snow. Later in Jan. another snowstorm swept the interior New York and extended well into New England. A third snowstorm occurred at the end the month. *Subject Headings:* **1. Snow data 2. Record snowfall, Northeastern U. S. 836) 3. Northeastern United States.**—*A.H.K.*

12.11–353 551.578.46(98/99)

Bader, Henri, **Theory of densification of dry snow on high polar glaciers.** *U. S. Snow Ice d Permafrost Research Establishment, Research Report*, 69, Jan. **1960.** 8 p. fig., 3 refs., eqs. **DWB, DLC**—Relations between rate of snow accumulation, snow density, time, and pth below the surface are formulated in terms of a compactive viscosity factor, assumed to be function of density and temperature alone. The parameters vary with the snow-type quences of different climatic areas of high-polar glaciers. The theory could be useful in an

analysis of the data obtained from the large number of snow pits in Greenland, Ellesm Island and Antarctica. It is applicable to all observed depth-density profiles except th from very deep pits and corings. The rate of densification is no longer proportional to str under higher stresses, but is some stronger function, and the theory then becomes more co plicated. *Subject Headings:* **1. Snow cover density 2. High polar glaciers.**—*SIPRE abstr*

12.11–354 551.578.46:551.322:546.211

*Sharp, Robert P.; Epstein, Samuel and Vidziunas, Irene (*all, Calif. Inst. of Tech.*), **Oxyg isotope ratios in the Blue Glacier, Olympic Mountains, Washington, U. S. A.** *Journa Geophysical Research*, Wash., D. C., 65(12):4043–4059, Dec. **1960.** 7 figs., 7 tables, 16 r **DLC**—The mean per mil deviation from a standard (average ocean water) in the O^{18}/O^{16} r of 291 specimens of ice, firn, snow, and rain from the Blue Glacier is −12.4; extremes −8.6 and −19.2. This is consistent with the moist temperate climatological environm The O^{18}/O^{16} ratio of snow decreases with declining temperature of precipitation, and it decreases with increasing altitude at 0.5/100 m. Analyses of the three principal types of coarse-bubbly, coarse-clear, and fine, composing lower Blue Glacier, show that ratios coarse-clear ice are generally lower and for fine ice they are mostly higher than the ra for coarse-bubbly ice. This indicates that the fine ice represents masses of firn and s recently incorporated into the glacier by filling of crevasses or by infolding in areas of se deformation. Coarse-clear ice masses may represent fragments of coarse-bubbly ice wi a breccia formed in the icefall. Because of unfavorable orientation, these fragments c have undergone exceptional recrystallization with reduction in air bubbles and, possibl relative decrease in O^{18}. A longitudinal septum in the lower Blue Glacier is characterize higher than normal O^{18}/O^{16} ratios. These values are consistent with an origin for this fea involving incorporation of much surficial snow and firn near the base of the icefall. San from longitudinal profiles on the ice tongue suggest that ice close to the snout comes from parts of the accumulation area. Analyses from the light and dark bands of ogives are patible with the concept that the dark bands represent greatly modified insets of fir breccia filling icefall crevasses. The range in ratios of materials is much greater in the accu tion area than in the ice tongue. This is attributed to homogenization, much of which place during the conversion of snow to glacier ice. This is supported by comparative ana of snow layers when first deposited and months later after alteration. Refreezing of rai meltwater percolating into underlying cold snow is an important mechanism as show analyses of ice layers and lenses in the firn formed in this manner. *Subject Headings:* **1. Ox isotope ratios of glacier ice 2. Glacier ice 3. Blue Glacier, Olympic Mts., Washi** —*Authors' abstract.*

12.11–355 536.24:551.5

Sulakvelidze, G. K., **Uravnenie teploprovodnosti poristykh sred, soderzhashchikh na chennyĭ par, vodu ili led.** [Thermal conductivity equation of porous media cont saturated vapor, water or ice.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 2:28 Feb. **1959.** 6 refs., 10 eqs. **DLC**—The author examines the problem of heat transmiss porous media with temperatures close to temperatures of phase transitions. The eq describing the general processes of heat conductivity of moist porous media is derived na

$$\frac{\partial u}{\partial t} = \lambda \frac{1 + \frac{D}{\lambda}\frac{L}{c\rho} f'(u)}{1 + \frac{L}{c\rho} f'(u)} \frac{\partial^2 u}{\partial z^2} + \frac{LD}{c\rho} f''(u) \left(\frac{\partial u}{\partial z}\right)^2$$

In this equation the role of the coefficient of heat conductivity is fulfilled by the functi termed "coefficient of effective heat conductivity" in contrast to λ molecular coefficient conductivity:

$$\lambda_{ef} = \lambda \frac{1 + \frac{D}{\lambda} f'(u) \frac{L}{c\rho}}{1 + f'(u) \frac{L}{c\rho}}$$

The equation for heat conductivity is simplified and written

$$\frac{\partial u}{\partial t} = \lambda \left\{ 1 + \frac{D}{\lambda} \frac{L^2}{\rho} \frac{e_0}{ARn} \frac{1}{u^2} \right\} \frac{\partial^2 u}{\partial z^2}$$

In order to simplify its solution, a new function $Q = u - u_0$ is derived where u_0 = temperature of freezing of water according to the absolute scale, Q = temperature measured from this point in °C and

$$\frac{\partial Q}{\partial t} = \lambda \left\{ 1 + \frac{D}{\lambda} \frac{L^2}{c\rho} \frac{e_0}{AR_n} \frac{1}{u^2_0} \right\} \frac{\partial^2 Q}{\partial z^2}$$

The problem on the distribution of temperature in a snow cover under given conditions is reduced to solving the Fourier equation with the coefficient of temperature conductivity λ_{ef}. The computation of λ_{ef} is illustrated. *Subject Headings:* **1. Snow cover temperature distribution 2. Thermal conductivity in porous media 3. Heat conductivity equations.**—*I.L.D.*

12.11–356 551.578.46:551.524:551.521.64

Tien, Chi, **Temperature distribution of snow with gamma ray radiation.** *U. S. Snow Ice and Permafrost Research Establishment, Research Report*, 67, Jan. **1960.** 4 p. 2 figs., table, 3 eqs. **DWB, DLC**—The temperature distribution in snow subjected to gamma radiation from an operating nuclear reactor is analyzed mathematically, assuming that the effect of radiation is equivalent to a continuous heat source, the intensity of which is a function of the radial distance from the reactor. Steady-state solutions are derived for two cases: when the radial distance is 13 ft and when it is 19.1 ft. The results indicate that the temperature of the snow in certain regions in the several feet immediately below the foundation will exceed the design limit of 20F. Increasing the shielding of the reactor will reduce the intensity of the radiation and snow temperature. Other possible ways to reduce the snow temperature include the use of refrigeration coils and the forcing of atmospheric air through the snow. *Subject Headings:* **1. Thermal properties of snow houses 2. Snow temperatures 3. Gamma ray radiation effects on snow.**—*SIPRE abstract.*

12.11–357 551.578.462

Pavlov, A. V. and Rauner, Iu. L., **Nekotorye rezul'taty nabliudenii za sostavliaiushchimi teplovogo balansa snezhnogo pokrova.** [Results of investigation into thermal balance components in snow cover.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geog.*, No. 5:53–59, May **1960.** 4 figs., 3 tables, 5 refs., 5 eqs. **DWB**—All the elements of heat balance of a snow cover were calculated from external observations carried out in March 1958 on plots with meadow grass, within a glade in a mixed forest near Zagorsk (Moscow). The turbulent exchange, P, between snow cover and atmosphere and heat loss by evaporation from the snow surface LE were determined by the equations:

$$P = \rho C_p D \Delta T = 0.019 D \Delta T - (\text{cal/cm}^2 \cdot \text{min})$$

and

$$LE = \rho L D \Delta_q = 0.033 D \Delta e \ (\text{cal/cm}^2 \cdot \text{min}),$$

where D = integral coefficient of exchange (cm/sec); $\Delta T = T_0 - T_2$ = difference between surface of snow temperature, T_0, and temperature T_2, at a height of 2 m; $\Delta q = q_0 - q$ = difference between specific atmospheric humidity at the snow surface and at $2m(q_2)$; $\Delta e = e_0 - e_2$ = difference between absolute humidity of saturated air at the snow surface, e_0 (calculated for T_0) and absolute humidity at $2m$, e_2, (mb); ρ = atmospheric density; C_p = specific heat capacity of air at constant pressure; L = heat of evaporation-condensation. The coefficient of integral exchange was determined by:

$$D = \frac{R - B}{0.019\Delta T + 0.033\Delta e} \ (\text{cm/sec})$$

where R and B = all radiational balance and heat flux through the snow surface (cal/cm²/mi respectively. A simplified formula for B is:

$$B = \frac{C_p{}^1 H}{60t}\alpha(t) \ (\text{cal/cm}^2\cdot\text{min}),$$

where H (cm) = layer in which diurnal temperature variation is distinctly expressed, t = co putation period (hours), $\alpha(t)$ = integral function of temperature field of the snow cover depe ing upon change of temperature with time. Data giving the 24 hour variations and to of the components of the heat balance at Zagorsk and in the Leningrad district for March presented and compared. At Zagorsk the total 24 hour heat flux from the soil to the sn cover was close to the total 24 hour flow from the snow cover to the atmosphere for aver weather conditions. *Subject Headings:* **1. Snow cover 2. Heat balance of snow cover 3. gorsk, U.S.S.R. 4. Leningrad, U.S.S.R.**—*I.L.D.*

12.11–358 551.578.48(49

§†Gams, Ivan, **Snezni plazovi v Sloveniji v zimah 1950–1954.** [Avalanches in winte 1950–1954 in Slovenia.] *Geografski Zbornik*, Ljubljana, 3:121–219, **1955.** figs. (fold ma 25 refs. French summary p. 215–218. **DLC, CU**—A study of the character, frequency distribution of avalanches from 1950–1954. Climatic factors, in particular, a rapid chang temperature triggers the avalanche but defrosted slopes facilitate the rapid and often astrous movement. The climate of Slovenia, winters of 1950 to 1954 are described. synoptic weather map of Europe, Jan. 30, 1951 and Feb. 7, 1951 is included. Specific locali are described and the type and frequency of avalanches indicated. Avalanches are lim on the south and southeast slopes, not by climatic factors but by the karst landscape wit irregular surfaces which impede avalanche motion. *Subject Headings:* **1. Avalanche frequ distribution 2. Slovenia, Yugoslavia.**—*E.Z.S.*

12.11–359 551.578

Akkuratov, V. N., **Osnovy predskazaniia nekotorykh tipov lavin.** [Basis of predi for some types of avalanches.] *Vsesoiuznoe Geograficheskoe Obshchestvo, Leningrad, Izve* 92(5):420–426, Sept./Oct. **1960.** 18 refs. **DWB, DLC**—The author presents a classifica of avalanches on the basis of the physical properties involved in their origin. All avalan are divided into dry and wet. The dry avalanches are composed of the following: (1) lanches formed from the redistribution of the thickness of the snow cover and accumul of snow as a result of snow storms; (2) avalanches resulting from sublimational diaph (loosening of snow under the influence of metamorphosis); (3) avalanches produced by perature contraction of snow and (4) avalanches from freshly fallen snow. The class o avalanches includes the following: (1) insolation avalan (2) advection avalan (3) intermediate avalanches produced by the simultaneous action of solar energy and adve air masses upon the snow cover and (4) avalanches arising from the pressure of water cur beneath the snow cover. *Subject Heading:* **1. Avalanche classification.**—*I.L.D.*

HYDROMETEOROLOGY (551.579)

See also: **Soil moisture** (Rode), 12.11–18; **Ground-water levels, New Mex., 1956** (Reeder et al.), 12.11–23; **Primer on water** (Leopold, Langbein), 12.11–36; **Influence of sub-permafrost water and naleds on water balance, N.E. U.S.S.R.** (Kalabin), 12.11–139; **Ground-surface water relationships, Dnieper-Don Basin, U.S.S.R.** (Zakharchenko), 12.11–140; **Avalanches as a hydrologic factor** (Losev), 12.11–144; **Radioactive meas. of hydrol. regime** (Dimaksian), 12.11–180; **Sudden changes on Earth temp.** (Sarson), 12.11–265; **Evap. during spring snow melt** (Simojoki), 12.11–319; **Isoline charts of annual precip. norms, China** (Yeh, Lo), 12.11–373.

12.11–360 551.482:551

Goroshnikov, E. A., **Transformatsiia maksimal'nykh urovneĭ vesennego polovo ust'evom uchastke Severnoĭ Dviny.** [The progress of the maximum level of the spring

n the estuary of the Northern Dvina.] *Meteorologiia i Gidrologiia*, Moscow, No. 8:38–41, Aug. 1960. 3 figs., 8 eqs. **DWB, DLC** (QC851.M27)—Data of the level of the spring flood maximum for 10 different stations in the estuary for the period 1917 to 1954 are examined. Curves were drawn for each year showing the change in height of this maximum level along the length of the estuary. These curves were all of the same shape and varied only in the height of the curve above the horizontal axis. A series of curves for varying initial height of the flood maximum at the highest upstream observing point are drawn. Interpolation between these curves will give an estimate of the spring flood maximum for any point downstream if the level at the highest point is known. From a study of the curve, equations are derived which will serve the same purpose. *Subject Headings:* **1. River flow 2. Spring flood maximum level 3. Northern Dvina River, European U.S.S.R.**—*R.B.*

12.11–361 551.579:551.573:581.11:634.94(489)

*Holstener-Jørgensen, H. (*Danish Forest Experiment Station*), **A contribution to elucidation of the evapotranspiration of forest stands on clayey soils with a high groundwater-table.** *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Publication*, No. 48:286–289, **1959.** 4 tables, 2 refs. **DWB** (M79 1611co)—Periodic measurements of the depth to the water table have been carried out during recent years at the Danish Forest Experiment Station. Tabulated data for 1956 and 1957 are given. Observations show that there is reason for assuming that in many cases such measurements would provide valuable information concerning the water consumption of forest-tree stands. It would also be possible to collect information to explain how interference in the silvicultural system may influence water consumption. The localities described may be considered as lysimeters on a big scale under quite natural conditions permitting experiments which could never be carried out under conditions provided by a laboratory. *Subject Headings:* **1. Evapotranspiration of forests 2. Denmark.**—*E.Z.S.*

12.11–362 551.579.1:551.577(52)

Fukuhara, K., **On the relationship between precipitation and stream flow and forecasting of peak flow.** *Journal of Meteorological Research*, Tokyo, 13(1):1–11, Jan. **1961.** 17 figs., 2 tables, 6 refs., 29 eqs. In Japanese; English summary p. 1. **DWB, DLC**—The purpose of this paper is to study a mechanism of the relationship between precipitation and stream flow and to describe a method of forecasting of peak flow. A computed hydrograph obtained by taking into consideration the surface runoff, interflow, ground water flow and effective precipitation by the experimental equation, based on the data in Teruoka and Horinouchi basins, showed good agreement with the factual hydrograph, particularly peak flow and its time. *Subject Headings:* **1. Peak flow forecasting 2. Precipitation-stream flow relationships 3. Teuoka Basin, Japan 4. Horinouchi Basin, Japan.**—*Author's abstract.*

12.11–363 551.579.5:551.437(282.247)

Lobanskaia, N. P., **Orientirovochnaia otsenka gruntovogo stoka po gidrometeorologicheskim i morfometricheskim dannym.** [Approximate evaluation of ground water runoff from hydrometeorological and morphometric data.] *Meteorologiia i Gidrologiia*, No. 6:28–30, June 1960. 3 figs., 5 eqs. **DWB, DLC**—The formation of ground water runoff, as main source of the river feed, is caused by many little known physical and geographic conditions. A study of these conditions was made on the left shore of the Dnieper-Don River depression in respect to the following two problems: 1) relation of ground water runoff with minimum surface runoff and 2) influence of river length on magnitude of ground water runoff. The data observed during 20–30 years on 13 tributaries of the Dnieper River basin were analyzed and graphically coordinated in respect to relation of average monthly summer and winter runoff to average annual runoff. Scattering, caused by undetermined factors, is reduced by mathematical formulation of the runoff and introduction of the coefficient of total long period runoff (η_0) and replotting the data taking into account this coefficient (η_0). The relation of river length to average annual ground water runoff is also mathematically formulated and graphically expressed taking account of the coefficient of total runoff (η_0). Application of this formula in

23 cases showed deviation from actual values of about 10–13%. *Subject Headings:* **1. Run calculations 2. Dnieper-Don River Basin, European U.S.S.R.**—*N.P.S.*

CLIMATOLOGY AND BIOCLIMATOLOGY (551.58–89)

CLIMATOLOGY (551.58)

See also: **Principles of climate** (Mo), 12.11–10; **Introduction to climate** (Scherhag), 12.11–31; **Alexander von Humboldt's met. and climat. works** (Körber), 12.11–72; **Climat. edge-punched cards** (Booth), 12.11–152; **Climate of atmos. disturb., Europe** (Dammann), 12.11–380.

12.11–364 551.58:551.

Leopold, Luna B. (*U. S. Geol. Survey, Wash., D. C.*), **Climatology and the problems western grasslands.** *American Association for the Advancement of Science, Wash., D. Publication*, No. 53:281–287, **1959.** 8 refs. **DWB** (M86:58 A512gr)—The main problem western grasslands are: 1) need for increasing water supply; 2) prevention of erosion and 3) crease of total forage production. These problems are only indirectly related to climate, the climatologist may contribute much to solving them. The techniques of climatology co be interwoven through many different kinds of peripheral studies. It is pointed out ecological studies in the plant field involve the interrelation of soils, water, microorganisms temperature and other weather factors. The climatic data are analyzed by the ecologist has a good understanding of meteorological concepts and who is better than a climatolo for this purpose. It is necessary that more emphasis be placed on the study of climatol *Subject Heading:* **1. Climatology research on grasslands.**—*I.S.*

12.11–365 551.58:581.9:912(235

†Schweinfurth, Ulrich, **Die horizontale und vertikale Verbreitung der Vegetation Himalaya.** [Horizontal and vertical distribution of vegetation in the Himalayas.] *Bo Geographische Abhandlungen*, (publ. Bonn, Ferd. Dümmler), No. 20, **1957.** 372 p. 2 m (fold. in pocket). Bibliog. p. 335–364. Résumés in English, French, Spanish and Rus p. 365–372. **DLC.** Review by N. L. Bor in *Geographical Journal*, London, 124(4) Dec. **1958.**—Regional analysis and description of the types of vegetation under discus constitute the main part of the paper which is introduced by general remarks about the mat used, the method used and the boundaries of the Himalayan regions considered. A survey of the history of research in plant geography in this area, dating back to Alexande Great, is included. The last chapter summarizes the results of the work and deals with nomena of particular interest in the Himalayan area e.g., dry valleys, influence of as position of the tree line, and influence of man on natural vegetation. A map on a 1:1,000,000 shows the distribution of the different types of vegetation. Cross sections the vertical arrangement of the vegetation. *Subject Headings:* **1. Vegetation distrib 2. Plant geography 3. Himalayas.**—*E.Z.S.*

12.11–366 551.58:625.74 551.58:629.139:

Stokstad, O. L. (*Mich. State Hwy. Dept.*), **The climate environment as a factor in bui roads and airport pavements.** *Meteorological Monographs*, Boston, 4(22):89–91, May **DWB, DLC**—Climate is one of the basic considerations in designing and building roa airport pavements. Its influence is so general that a short paper can cover only a few p of the complete subject. Therefore, this paper will attempt to discuss the subject u under the following four headings: (1) A general statement regarding the climatic infl in the development of highway and airport needs. (2) Climate as it enters into the Mic technique for pavement design (this is often summed up in the statement "Traffic controls surface design, and climate, together with its associated soil and drainage condi determine foundation design"). (3) Climate as a factor in construction operations (this becomes important, especially in connection with the timing of operations and in the de ment of equipment). (4) Climate as a factor in the service life of a pavement and in th

of its proper maintenance. *Subject Headings:* **1. Climatic influences on site selection 2. Climatic influences on airport runway design 3. Michigan.**—*Author's abstract.*

CLIMATIC ZONES (551.581)

See. **Symposium on Man and Animals in the Tropics, 12.11–2; Vert. and horiz. veg. zones, Tibet** (Wissmann), **12.11–25.**

CLIMATE OF PARTICULAR PLACES (551.582)

See also: **Met. and climat. with elements of agromet.** (Kiriakov, Todorov), **12.11–9; Land and life in S.W. Asia** (Cressey), **12.11–11; Classification of rivers, U.S.S.R.** (Kuzin), **12.11–19; Climatic conditions, Hurbanovo, Czechoslovakia** (Petrovič, ed.), **12.11–26; Atlas of oceanog. climate, Hawaiian Isl.** (Seckel), **12.11–44; Climate diagrams** (Walter, Lieth), **12.11–46; Irish weather diary, 1711–1725** (Dixon), **12.11–65; Obs. of German climatic stations** (Brose), **12.11–156; Met. Bulletin, Gric Obs., Zagreb, Yugoslavia, 12.11–157; Climatic control of land utilization, Loxton, Australia** (Mason), **12.11–186; Rainfall depth-intensity-duration curves, Japan** (Yoshino), **12.11–334.**

12.11–367 551.582(94):72 551.584.61

Drysdale, J. W., **Designing houses for Australian climates.** 2nd ed. *Sydney, Australia. Experimental Building Station, Bulletin*, No. 6, **1959.** 47 p. 5 figs., 2 tables, 18 refs. **DWB** M:690 A938bu)—This booklet gives an account of the efforts being made to design houses suitable to the climate of Australia. In Australia, 3 kinds of climate are found: (1) hot-humid with heavy summer rainfall and dry winter, (2) hot arid with irregular low rainfall in summer and (3) temperate zone with rainfall throughout the year. The climatic factors to be considered when designing houses include relative humidity, temp., prevailing winds, sunshine and rainfall. One example is given to show how to control the flow of heat and change in temp. indoors by the use of thermal insulation and another shows how to reduce the effects of rainfall, sunshine and wind. The descriptions are accompanied by designs. *Subject Headings:* **1. Climate of Australia 2. Housing design 3. Australia.**—*A.H.K.*

12.11–368 551.582(689)

*Rhodesia & Nyasaland Meteorological Service, **The climate of Lusaka.** Its *Climate Information Sheets*, No. 10, May **1959.** 4 p. 2 tables.—The capital of Northern Rhodesia, Lusaka, lat. 15°25′S and long. 28°17′E is located about 4100 to 4200 ft above the mean sea level. The surrounding area rises to 3800 ft. It has dry and wet seasons which last from May to Sept. and from Nov. to March, respectively. The annual rainfall is over 32 in. Winds are persistent and easterly with an average speed of 10 m.p.h. There is no frost. The mean relative humidity ranges from 41% in Oct. to 83% in Jan. Temps. are equable, but vary from month to month. A maximum monthly average of 79°F and a minimum of 62°F prevails and the annual mean temp. is 67.5°F. *Subject Headings:* **1. Climate of Lusaka, Northern Rhodesia 2. Lusaka, Northern Rhodesia.**—*N.N.*

12.11–369 551.582(514) 551.586:633.51

*Xi, Yào-guo (*Chinese Acad. of Agric. Sci., Shensi*), **Discussion on the future development of cotton cultivation in Western Kangshu from viewpoint of climate.** *Acta Meteorologica Sinica*, Peking, 30(2):137–149, **1959.** 16 tables, 2 refs. In Chinese; English summary p. 149. **DWB**—In this paper the climatic characteristics of western Kangshu are first described and then the possibility of the development of cotton cultivation from the view-point of climatic conditions is discussed. It is pointed out that in this region during the growing season the sunlight is abundant, the rainfall is scarce and the weather is steady. These conditions surpass those of the cotton area in the region of the Yangtze River and Haung-he. But there are also defects for cotton development in this region. They are: (1) the growing season is short, (2) the weather is more changeable in spring, (3) the temperature rises rapidly in spring and decreases rapidly in autumn and (4) in certain places the temperature is too low for cotton. To overcome these defects certain suggestions are made. After a careful comparison of the

climate of different places, a subdivision of regions for cotton development is suggest
Subject Headings: **1. Climate of Kangshu 2. Cotton cultivation 3. Kangshu, China**
Author's abstract.

12.11–370 551.582.1(4

Jensen, Kr. M., **An outline of the climate of Denmark.** *Geografisk Tidsskrift*, Copenhag
59:103–118, **1960.** 6 figs., 10 refs. **DWB**—This article contains a summary of the aver
temperature conditions, the quantities of precipitation and the wind conditions. Furth
an analysis is given of the distribution, over a rather great number of years, of these clim
elements. A representation is given of the diurnal temperature trend and of the diu
quantity of precipitation at a certain station in the period 1946–1949: thus, we get an impres
of the seasonal alternations of the weather conditions. *Subject Headings:* **1. Climate of D
mark 2. Denmark.**—*Author's abstract.*

12.11–371 551.582.2:551.524.3(71

*†Thomas, M. K., **Canadian Arctic temperatures.** *Canada. Meteorological Branch, C*
3334, CLI-24, May 9, **1960.** 14 p. 11 figs., 6 tables, 18 refs. **DWB, DLC**—A study
includes temperature differentials in the low and high altitudes of the Arctic; the annual, win
"summer" and diurnal temperature variations; the heating degree-days; the wind c
comparative foreign temperatures; special temperature surveys and the temperature fluc
tions. The report indicates that the wind chill averages are, on the whole, higher to the no
west of Hudson Bay than in the far north, heating degree-days are accumulated on the nort
islands, midwinter temperatures fluctuate during the years. A maximum was reached in 1
Subject Headings: **1. Temperature variations 2. Canadian Arctic.**—*N.N.*

12.11–372 551.582.3:551.557.2(94,

*Phillpot, H. R. (*Bur. of Met., Melbourne*), **Winds at 30,000 and 40,000 ft in the Austr
New Zealand-Fiji area.** *Australia. Bureau of Meteorology, Project Report*, No. 59/2
April **1959.** 6 p.+13 p. of maps, 2 tables (1 fold.), 8 refs. **DWB**—From visual, ra
theodolite, and radar wind observations made during 1950–58, provisional monthly char
the 30,000 and 40,000 ft flow were constructed. Depicted on these charts, over the area
western Australia east to longitude 180°, are isotachs and isopleths of the standard v
deviation of the wind. The flow being predominantly westerly, streamlines were not dr
Data for 21 Australian stations (including outlying islands), based on periods of reco
various lengths, were used, along with published data for Auckland and Invercargill
Zealand) and Nandi (Fiji). For the Australian station, tables of the monthly values o
standard deviation of the X and Y components, the mean vector wind, and the overall star
vector deviation, are given. *Subject Headings:* **1. Upper air wind data 2. Upper air
charts 3. Australia 4. New Zealand 5. Fiji.**—*R. S. Quiroz.*

12.11–373 551.582.3:551.577.32:551.579

Yeh, Yung-I and Lo, K'ai-fu, **Postroenie kart izoliniĭ norm godovykh osadkov i god
stoka dlia territorii Kitaia.** [Construction of isoline charts of annual precipitation n
and annual runoff for China.] *Vsesoiuznyĭ Gidrologicheskiĭ S'ezd, Trudy* [of 3rd Confer
Oct. 1957], Vol. 7, issued **1959.** p. 104–107. **DWB** (M79 V985tr)—The Peking Res
Institute of Water Resources and the Geographical Institute of the Chinese Acade
Sciences in 1957 drafted charts of average annual isohyets and unit discharge (runoff) f
whole territory of China. Observations of 1947 precipitation stations (total of 25,000 s
years) and 587 discharge gaging stations (total of 3,700 station years) were used.
observation periods were extrapolated but the data are less reliable in the mountainous r
and West China. A short description of hydrometeorological conditions in China is
There are five precipitation and runoff zones in China ranging from 0 mm to 1600 m
more of precipitation and from 0 mm to 1000 mm and more of runoff. *Subject Hea*
1. Annual precipitation variations 2. Annual runoff variations 3. Climatic charts 4.
—*J. Němec.*

CLIMATIC CHANGES (551.583)

See also: **Climate diagrams** (Walter, Lieth), 12.11–46; **Evolution of Earth's atmos.** (Chamberlin), 12.11–104.

12.11–374 551.511:551.521:551.583

Flohn, Hermann (*Frankfurt-Würzburg*), **Klimaschwankungen der letzten 1000 Jahre und ihre geophysikalischen Ursachen.** [Climatic variations during the last 1000 years and their geophysical causes.] *Deutscher Geographentag, Würzburg, July 29–Aug. 5, 1957, Tagungsbericht und Wissenschaftliche Abhandlungen,* (1958?). p. 201–214. 4 figs., table, 15 refs. **DLC**—The use of the different sources for investigating the climate of the past 1000 years, namely instrumental observations, systematic noninstrumental observations, notes in chronicles and indirect climatic evidence such as pollen evidence and historical glaciology is discussed with the aid of examples. On the basis of the diverse evidence, the climatic variation in Central or Western Europe during the past 1000 years showed the following stages: (1) a relatively mild period between 1000–1250 with light variable winds; relatively warm period during 1200–1400; the peak of the climatic optimum was in the period 1280–1380; (2) the period 1429–1465 was climatically unfavorable being marked by cold winters and cool summers and indicating extreme circulation anomalies; (3) after some improvement in the first half of the sixteenth century a deterioration prevailed during 1541–1640; (4) a distinct improvement occurred during 1680–1730; (5) the severe winter of 1739–40 initiated a new climatic deterioration which continued into the second half of the nineteenth century; (6) in 1880 a climatic improvement set in. The explanation of the climatic variation is to be sought in investigations and computations of atmospheric balance (radiation, heat and water balance) and of anthropogenic influences on the atmospheric balance. The roles of atmospheric CO_2 and atmospheric moisture in influencing the radiation and heat balance and hence in producing climatic variation are discussed by summarizing the results of studies on variation in atmospheric CO_2 and variations in continental rainfall. *Subject Headings:* **1. Climatic variations 2. Anthropogenic influences on atmospheric balance 3. Carbon dioxide theory of climatic change.**—*I.L.D.*

12.11–375 551.583.14:551.513.2:551.524.34

Portig, Wilfried H., [**Comment on**] **Richard Fay: Some variations in European climatic temperature and** [**Reply by**] **Fay.** *Journal of Meteorology,* Boston, 17(4):474, Aug. 1960. 3 refs. (For abstract on original article, *see* 10.8–250, Aug. 1959, *Met. Abs.*) **DWB, DLC**—The author's conclusions coincide well with those of FAY. The results of comparative studies showed that the climate in Prague in 1800 had the most similarity with that to the southeast; in 1950, with that to the east-northeast; and in 1920, to the north-northwest. There is a counterclockwise change of the direction of greatest similarity which is also found in FAY's map. All of his maps show a neutral point between high pressure over eastern and southwestern Europe and low pressure over northwestern and southeastern Europe. These neutral points move from 1795 through 1915 counterclockwise approximately on a half circle with its center near Munich, South Germany. FAY replied that if the proposals are correct, an increasing continentality should become evident in northwest Europe, possibly during the period 1931 to 1960. A 260-year cycle is indicated. *Subject Headings:* **1. Climatic changes 2. Temperature changes 3. 250-year climatic cycle 4. Northwest Europe.**—*E.Z.S.*

12.11–376 551.583.3

Veryard, R. G.; Lamb, H. H.; Callendar, G. S. et al., [**Comments on**] **E. B. Kraus: Synoptic and dynamic aspects of climatic change.** *Royal Meteorological Society, Quarterly Journal;* 86(370):569–575, Oct. 1960. 2 figs., 5 refs. (For abstract on original article, *see* 11.5–318, May 1960, *Met. Abs.*) **DLC, DWB**—This is a discussion of KRAUS's paper which attempts to give a physically plausible explanation, based on the minimum number of assumptions, of climatic changes. The discussion started after EADY had read a summary of KRAUS's views. The participants were R. G. VERYARD, H. H. LAMB, L. C. W. BONACINA, G. MANLEY, D. J. SCHOVE, D. M. HOUGHTON, G. S. CALLENDAR. Reply to their questions given by E. T. EADY and E. B. KRAUS are also included. The questions related to several assumptions of the author, apparently in need of more evidence. *Subject Heading:* **1. Climatic changes.**—*I.S.*

MICROCLIMATOLOGY (551.584)

See also: **Designing houses for Australian climates** (Drysdale), 12.11–367.

12.11–377 551.584.4:551.521.32:6

Ferguson, J. H. A., **A comparison of two planting systems in orchards as regards t amount of radiation intercepted by the trees.** *Netherlands Journal of Agricultural Scien* Wageningen, 8(4):271–280, Nov. **1960.** 2 figs., 4 tables, 2 refs. **DA**—A method has be worked out, and applied under conditions at De Bilt,, Holland, to compare the gross amou of global radiation received by orchard trees planted in different patterns. A single r planting system and a triangle-row system have been compared, each for various orientati of the rows. It appeared that under the single row system the orientation of the rows m considerably influence the amount of radiation received, in contrast with the triangle-r system, where the effect of orientation may be neglected. The effect is not the same in months. In September the single rows running east-west yielded 9% more radiation th rows running north-south. Averaged over all orientations the amount of radiation recei was the same for both planting systems. An alternative, probably more simple, metho described at the end of the discussion. *Subject Headings:* **1. Orchard microclimatology 2. I diation measurement comparisons 3. Radiation interception by trees 4. Row orientat influence on radiation interception 5. De Bilt, Netherlands.**—*Author's abstract.*

12.11–378 551.584.5

Sekiguti, Takeshi (*Tokyo Univ. of Education*), **Local climate and city climate.** In national Geographical Union, Proceedings of the Regional Conference, Japan, 1957. Iss Tokyo, **1959.** p. 188–192. 5 figs. **DWB** (910.6 161pr)—The weather in Sugadaira Uchihara was studied in great detail. Temperature and humidity maps for each show distribution patterns in each locality. Observations were made and data collected at Ku gaya, Ueda and Yonezawa. It is shown that city air is always warmer than country *Subject Headings:* **1. Microclimate of towns 2. Sugadaira, Japan 3. Uchihara, Japan.**—*E..*

12.11–379 551.584.61:551.586:628.8:631.5

Sazhin, F. N., **Primenenie meteorologicheskikh priborov pri vyrashchivanii ovoshch rasteniĭ v teplitsakh.** [The use of meteorological instruments in the growing of vegeta in a greenhouse.] *Meteorologiia i Gidrologiia*, Moscow, No. 11:38–40, Nov. **1960.** 2 **DWB, DLC**—Trials were carried out over a number of years on the use of thermographs hygrographs in greenhouses. There is no need to shade these instruments from the su the direct rays of the sun have little effect on the readings. They may be placed either on ground or in the free air but care must be taken to keep clear of heating pipes or ventila windows. During the author's investigations a great number of instruments were used, l to one side of the corridor of the greenhouse. The procedure for reading the instrumen described. *Subject Headings:* **1. Greenhouse climates 2. Thermographs 3. Hygrograph**

BIOCLIMATOLOGY (551.586)

See: Sec. on **Agriculture,** items 12.11–81 to 12.11–88; **Urban and seasonal influence on mortality, Paris** (du Mesnil du Buisson), 12.11–93; **Body reaction to microclimate** (Mirchev), 12.11–95; **Bioclimat. and biomet. aspects of allergic diseases** (Alemany-Vall), 12.11–96; **Leptospirosis; a contribution to local bioclimat.** (Mochmann, Hentschel), 12.11–97; **Cotton cultivation and climate, W. Kangshu, China** (Xi), 12.11–369; **Use of met. instruments in growing greenhouse vegs.** (Sazhin), 12.11–379.

UPPER AIR CLIMATOLOGY (551.587)

See: **Air currents in stratos.** (Dubentsov), 12.11–302; **Vapor pressure at various elev., Alps** (Hastenrath), 12.11–314.

ENVIRONMENTAL INFLUENCES (551.588)

See: **Urban and seasonal influence on mortality, Paris** (du Mesnil du Buisson), 12.11–93.

SYNOPTIC CLIMATOLOGY (551.589)

See also: **Large scale pressure patterns** (Wollkopf), 12.11–218; **Atmos. long wave-long range weather trend relationships** (Yabana), 12.11–219.

12.11–380 551.589:551.515.8(4)

Dammann, Walter, **Klimatologie der Atmosphärischen Störungen über Europa.** [Climatology of atmospheric disturbances over Europe.] *Erdkunde*, 14(3):204–221, Aug. **1960.** 14 figs., 4 tables, 5 refs. English summary p. 204. **DLC**—This study is based on an analysis of the distribution of low pressure areas during the decade 1948–1959. The distribution pattern shows close connection with the outlines of the European continent. This is explanable in terms of physical causation—differences in surface friction and temperature regime of land and water surfaces. Hence the conclusion that the sequence of weather conditions in Europe is significantly influenced by local geographical influences and not merely by the atmospheric events of a higher order. *Subject Headings:* **1. Synoptic climatology of atmospheric disturbances 2. Low pressure areas 3. Europe.**—*I.S.*

12.11–381 551.589:551.553.12

*†Dammann, Walter, **Die Windverhältnisse im Rhein-Main-Gebiet, eine Studie zur dynamischen Klimatologie der Mittelgebirge.** [Wind conditions in the Rhine-Main area: a study on the dynamic climatology of Mittelgebirge.] *Erdkunde*, Bonn, 14(1):10–29, March **1960.** 10 figs., 10 tables, 22 refs. **DLC**—The object of the paper is an analysis of the data of wind statistics from synoptic-climatological aspects. On the basis of observation material for the three years 1936–1938, for which period there are also available the data of weather flights, permitting the establishment of the thermal stratification of the atmosphere, it was possible to show that under certain atmospheric conditions there originates nightly an "independent" minor wind system with a vertical axis and air flow convergence along the Rhine Rift Valley. The mountain and valley wind systems of the Odenwald and Haardt Hills are incorporated in it. The meteorological basis of this wind system is a pronounced temperature inversion (during southeast weather) with an upper limit lying higher than the altitude of the bordering mountains, thus screening the air body of those altitudes against the higher parts of the atmosphere. It appears that in addition to the thermal conditions, dynamic effects, caused by the forced deflection of the air masses flowing across the bordering mountains in conditions of stable stratification and nearly laminar flow contribute also. It is suggested that under those conditions in the lee of the Odenwald above the Rhine Valley there is possibly a tendency to a weak trough of low pressure, as it is known to occur in a much more pronounced way of the lee sides of the high mountain ranges of the earth when they are crossed by air currents. It is however, characteristic of the way the atmosphere works that this dynamic effect becomes inoperative as soon as the inversion has been destroyed by sufficient temperature increase after sunrise, and the air flow has changed its character by a vertical exchange of the air bodies. Similarly this subordinate wind system does not even commence during weather conditions a priori characterized by unstable air stratification, like cyclonic west weather, although under these conditions air currents across the Rhine Rift Valley also occur. In those cases the wind direction in the valley is similar to that higher up, and the effect of mechanical deflection by the edges of the bordering mountains is slight and noticeable only during the night. No independent wind system originates as in the former case. These differences due to weather conditions are substantiated by the appended tables and maps. The result throws light on a process within the windfield of the German Uplands, so far almost ignored, which though less important geographically in comparison with the blocking of föhn effect, may nevertheless assume considerable importance for the air changes and the aerosol of the Rhine-Main basin with increasing industrialization. It could be demonstrated by means of synoptic-climatological methods used by the author several times in previous papers. *Subject Headings:* **1. Synoptic climatology of**

mountain and valley winds 2. Mountain and valley winds 3. German Mittelgebirge. *Author's abstract.*

12.11–382 551.58

§Barry, R. G. (*Univ. of Liverpool*), **A note on the synoptic climatology of Labrador-Unga** *Royal Meteorological Society, Quarterly Journal*, 86(370):557–565, Oct. 1960. 5 figs., 5 tab 10 refs. **DLC, DWB**—Aspects of the synoptic climatology of the Labrador-Ungava penins are investigated with reference to a classification of airflow pattern types, formulated on basis of synoptic weather maps for November 1956 to February 1958. The winters 1956 and 1957–58 exhibit, respectively, marked negative and positive temperature departures precipitation characteristics of the airflow types are discussed for these two seasons. validity of the airflow categories is statistically tested. *Subject Headings:* **1. Synoptic cli tology of Labrador-Ungava 2. Airflow pattern types 3. Synoptic weather maps 4. Labrad Ungava, Canada.**—*Author's abstract.*

MISCELLANEOUS (551.59)

COSMIC INFLUENCES (551.590)

See: **Tropopause altitude-solar activity relationships** (Rasool), 12.11–196; **Atmos. ozone invest. by photometry of lunar eclipses** (Fesenkov), 12.11–200; **Amount of ozone during solar eclipse, April 1958** (Yamasaki), 12.11–203; **Upper atmos. wind meas.** (Elford, Murray), 12.11–298.

VISIBILITY (551.591)

12.11–383 551.591.3:551.575.1:65

Tinney, E. B., **Rate of visibility deterioration in fog at Merryfield and the time of dispersal.** *Meteorological Magazine*, London, 89(1054):150–156, May 1960. 2 figs., 4 tab 2 refs. **DWB, DLC**—The features of the variation of visibility in fog at Exeter Airport, the time of fog dispersal were examined by W. E. SAUNDERS (1957). This investigation been carried out on precisely parallel lines to find out whether similar results can be found a rural area more removed from the sea. The results and tables are presented in a form sim to those of SAUNDERS' paper to facilitate comparison. The results show a close simila between the two. *Subject Headings:* **1. Visibility in fog 2. Merryfield, Eng.**—*E.Z.S.*

12.11–384 551.591.6:551.515.8

Andritoiu, Nicolae, **Transparenta maselor de aer in partea de sud a Republicii Popu Romine.** [Transparency of air masses in the southern part of Romania.] *Meteorol Hidrologia şi Gospodărirea Apelor*, Bucharest, 4(2):14–17, 1959. 3 figs., 3 tables, 3 9 eqs. Russian summary p. 73; French summary p. 75; English summary p. 77. **DWB**— author first presents the methods used for determining the transparency of the atmosp Then he studied the air's transparency at the Observatory of Atmospheric Physics (lat. 44 long. 26°13′, h 91 m). The author used hourly observations of direct radiation for a p of eight years (1950–1957). The values used for the determination of the air's transpar were the Linke opacity factor and the transmission coefficient. The author studied als daily and yearly variation of air mass transparency. He established separately the transparency of every air mass. *Subject Headings:* **1. Air mass transparency 2. Roman** *Author's abstract.*

12.11–385 551.

Antarkar, V. N. (*Met. Office, Jodhpur*), **A note on vertical visibility.** *Indian Journ Meteorology and Geophysics*, New Delhi, 11(2):204–205, April 1960. 2 figs., table, 5 **DWB, DLC**—The conditions over Jodhpur, India on the night of 26–27 May 1959 are b described as a typical illustration of conditions which may cause a deterioration of the ve visibility. The actual tephigrams are graphically represented and the hourly temper

nd wind speed from 26th evening to 27th morning are tabulated. *Subject Headings:* **1. Ver-ical visibility 2. Jodhpur, India.**—*I.S.*

OPTICAL PHENOMENA (551.593)

See also: **Searchlight beams in the atmos., -atmos. optics** (Rozenberg), 12.11–12; **Richard Tousey, Frederic Ives medalist for 1960,** 12.11–71; **Brightness of twilight and night sky** (Barteneva, Boiarova), 12.11–247.

12.11–386 551.593.11 :551.593.9

Rossman, Fritz O. (*Univ. of Munich*), **Banded reflections from the sea.** *Weather*, London, 15(12):409–414, Dec. **1960.** 2 figs., 2 refs. **DLC**—The author, while bathing at Coral Beach on the Atlantic Coast of Florida, observed a dark blue margin on the water surface bounding the seaward horizon. This blue border which occurred only occasionally and on occasions with clear blue skies over the sea and possibly cumulus over land appeared wider directly out to sea than to north or south. It also was found to vanish if the observer altered his elevation significantly. Observations from aircraft showed that this blue band consisted of light which was almost plane-polarized. It is suggested that the band was due to diffused sky-light reflected systematically from the water surface by a uniform series of waves parallel to the coast-line. The striking width of the blue band could be due to mirage effects as the phenomenon is observed with sea temperatures exceeding air temperatures. The author applies Wegener's theory of mirages to show that these postulations reasonably fit the facts. *Subject Headings:* **1. Blue band 2. Mirage effects 3. Coral Beach, Fla.**—*R.B.*

12.11–387 551.593.5

Gutshabash, S. D., **Rasseianie sveta v dvukhsloĭnoĭ atmosfere.** [Light scattering in a two-layered atmosphere.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 100:17–19, **1960.** fig., 3 refs., 15 eqs. Russian summary p. 17. **DWB**—A model of two-layered atmosphere with different indices of scattering is considered. This model can be taken as representing the Earth's atmosphere. V. A. Krat considers such a scheme for the Earth's atmosphere, but treats the scattering of the first order only. Yet the consideration of the problem with the inclusion of higher order scattering is of the greater interest. The author's previously derived formulas can be used for this. These formulas are for the coefficients of brightness for reflected, diffused and transmitted diffuse radiation through the media with multiple indices of scattering. The formulas give the precise values for the scattering of the first order, but only approximate ones for the higher orders. The methods and the results previously obtained by author are briefly described. He considered the scattering in the media bounded by two parallel planes. The coefficient of scattering was considered as dependent only on the depth $a=\alpha(z)$. Formulas for the optical depth, t, and optical thickness t_0 are given. The analytical development of formulas follows. *Subject Headings:* **1. Light scattering 2. Coefficient of light scattering 3. Atmospheric models.**—*B.J.G.*

12.11–388 551.593.5

Kagan, V. K.; Perel'man, A. Ia. and Riabova, E. P., **Iarkost' bezoblachnogo neba v dvukhparametricheskoĭ modeli atmosfery.** [Brightness of a cloudless sky in a two-parameter model of the atmosphere.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 100:20–24, **1960.** 5 figs., 5 tables, 4 refs. **DWB**—Based on the theoretical model of Shifrin and Minin, the computation of the brightness of cloudless sky is demonstrated. The comparison is made of computed and observed isophots and found to be agreeing satisfactorily. The closed two-parameter models of atmosphere are considered and briefly described. The authors believe that described model permits solution of the numerous problems related to computation and evaluation of the characteristics of the radiation field, in which it is permissible to neglect the absorption of radiation. The problem of the brightness of cloudless daytime sky needs to be solved for the study of the radiation regime on the surface of complicated configuration, when the quantity of scattered radiation falls on the arbitrary oriented area. Description and basis for computations follow with sequence of computations indicated. Examples of computations, corresponding to five positions of the sun and the same number of

the magnitude of albedo, are given. The authors conclude that the data obtained analytica well agrees with measured ones—computed distribution of the brightness in the sky perm determination of the flow of scattered radiation on the arbitrary oriented area. *Subj Headings:* **1. Atmospheric models 2. Sky brightness computation 3. Radiation regi** —*B.J.G.*

12.11–389 551.593.5:551.578

Quashnock, Joseph M. (*Ladd Air Force Base, Alaska*), **The whiteout phenomenon.** *U. Air force. Cambridge Research Center, Geophysical Notes*, No. 29, Dec. **1959.** p. 159–1 **DWB**—Whiteout is a loss of depth perception. Only two conditions are necessary for production—diffuse shadowless illumination and a uniformly mono-colored or white surfa Whiteout causes many aircraft accidents and methods to overcome this hazard are be investigated. *Subject Headings:* **1. Whiteout phenomenon 2. Polar whiteout.**—*E.Z.S.*

12.11–390 551.593

†Lange, Gottfried, **Die Calina—der Staubdunst des spanischen Sommers.** [The cali the dust haze of the Spanish summer.] *Archiv für Meteorologie, Geophysik und Bioklimatolo Ser. B*, Vienna, 10(3):396–403, **1960.** fig., 3 tables, 18 refs. German, English and Fre summaries p. 396. **DWB, DLC**—After introductory remarks about former papers on calina, the conditions for the development are discussed. A critical selection of calina d from the **Resumenes de los Observaciónes Meteorológicas** is used for the design of the sp distribution of this phenomenon. Finally, the annual variation of the frequency of calin studied. *Subject Headings:* **1. Dust haze 2. Calina 3. Spain.**—*Author's abstract.*

12.11–391 551.521.3:551.59

Penndorf, R., **Mie scattering in the forward area.** Avco Corp. Research and Advan Development Division, Wilmington, Massachusetts, Contract AF 19(604)-5743 (Researc aerosol scattering in the infrared), Scientific Report No. 2, Feb. **1960.** 89 p. 21 figs., 6 tal 18 refs., numerous eqs.—This investigation, dealing in general with the theoretical aspect the scattering of light, is limited to the forward scattering area. The discussion extensi illustrated, is systematically organized into six major chapters. First, the theory of scattering is discussed. Next, computation of intensity functions and related scatte functions for refractive indices are considered. This is followed by a general survey of ang scattering and a discussion of the results of forward scattering. The last two chapters approximation methods for forward scattering and discuss the application of theoretical to practical problems. *Subject Headings:* **1. Light scattering 2. Mie scattering th 3. Aerosol scattering in the infrared.**—*I.S.*

12.11–392 551.593

†Zamorskiĭ, A. D., **Sverkhperistye oblaka.** [Ultra-cirrus clouds.] *Meteorologi Gidrologiia*, Moscow, No. 4:26–28, April **1960.** 10 refs. **DWB, DLC**—The literatur ultra-cirrus clouds since their first description by M. Wolf (1916) is reviewed and an acc is given of ultra-cirrus clouds observed by the author in Leningrad from April 30 to Ma 1956. At the time of sunset on April 30 the sky had a grayish tint and seemed to be co with a veil darker than the sky. This veil or haze had a horizontal stratified structure. a short while the haze disappeared but then it reappeared whitish and brighter than the At this time the color of the veil began to resemble the silky color of small pearls and the s part of the sky became colored. The glowing cloud appeared as an independent light ele the extremely weak glow of these clouds indicated their low density. The twilight b ring was visible in each cloud. The nature of the cloud cover indicated that the ve atmospheric structure had the property of an inversion. The billows were predomin arc shaped like alto-cumulus clouds on transition to alto-stratus clouds. At a dun dep 2.5° the cloud cover began to show pink. After a while a pink color appeared at a heig 30°. The disintegration of the cloud layers proceeded from above downward. In this tion they began to fade when the sun sank to 4°. Their upper boundary at the same descended to 10°. Before their extinction the color of the haze layer was distinctly delin

and the pink patches coincided with the glow of the cloud. The luminous segment formed by the cloud diminished along the vertical and horizontal. At 4° above the horizon the last traces of the glowing cloud began to disappear. The height of the turbid layer was about 20 km—the approximate altitude of the tropopause during the interval April 30–May 3. *Subject Headings:* **1. Ultra-cirrus clouds 2. Leningrad, U.S.S.R.**—*I.L.D.*

12.11–393 551.593.7:535.242.2

*Wörner, H., **Messung der Himmelspolarisation in 5 Spektralbereichen.** [Measurement of polarization of the sky in 5 spectral bands.] *Zeitschrift für Meteorologie*, Berlin, 14(3):57–75, March 1960. 14 figs., 6 tables, 19 refs., 27 eqs. German and English summaries p. 57. **OWB, DLC**—After a brief description of the measuring equipment, i.e., a photographic recording polarimeter and a photometer for measuring the recording film, the evaluation method is discussed in detail. Since a zero-method is applied, the results do not depend on the gradation of the film and are not affected by possible variations of sensitivity of the photometer. Formulas are developed permitting the skylight polarization to be read from photometric data by means of simple tables. Particular stress is laid upon a precise definition of the effective wavelength for which the obtained data are valid. Finally, tabulated results of a 3-yr series of skylight polarization measurements in the zenith of Potsdam in 5 spectral regions are submitted. *Subject Headings:* **1. Skylight polarization measurements 2. Photometers 3. Photographic recording polarimeters 4. Potsdam, Germany.**—*Author's abstract.*

ELECTRICAL PHENOMENA (551.594)

See also: **Obituary of Fritz Schindelhauer** (Israël), 12.11–70; **Shielding of overhead lines against lightning** (Gridley), 12.11–99; **Index of JE of the E layer** (Minnis), 12.11–108; **F region height and thickness parameters** (Schmerling), 12.11–111; **High-voltage discharge by a vortex** (Vonnegut et al.), 12.11–237.

12.11–394 551.594:551.555.3:551.510.71(433)

†Reiter, Reinhold, **Das luftelektrische Erscheinungsbild des Südföhns in den Nordalpen nach synoptisch-klimatologischen Untersuchungen im Wettersteingebirge 1955 bis 1959.** [Atmospheric electrical phenomena of southern föhn in the northern Alps according to synoptic-climatological observations in the Wetterstein Mountains, 1955–59.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, Vienna, 12(1):72–124, 1960. 23 figs., 3 tables, 55 refs. German, English and French summaries p. 72–75. **DLC**—In this paper the author summarizes data, results of evaluations, and experiences in the field of atmospheric electricity, as far as connected with föhn situations. The observations were mainly made in the region of Garmisch-Partenkirchen (Wetterstein Mountains, Northern Alps) and cover a period of five years. Seven recording stations with heights between 675 and 2963 m above sea level were operated permanently, two further stations were operated on the Zugspitzplatt (2600 m) during two months in 1958. All nine stations are relatively short distances from each other. At each of the nine stations the atmospheric electrical potential gradient was recorded, at four of the permanent stations and at one of the temporary stations the air-earth current was recorded, too. Further there were recorded or measured positive and negative small ions, positive and negative conductivity, natural and artificial radioactivity of the air, condensation nuclei, air pollution, point discharge current, and sferics. A characteristic of this investigation is that a dense network of stations extending also in the vertical direction yields a synopsis of a small three-dimensional portion of the atmosphere, and that uniformly without interruptions through years. It is pointed out that a föhn situation is not distinguished by a special or extraordinary behavior of single atmospheric electrical elements, but by a typical accord of the atmospheric electrical and meteorological elements, with typical spatial variations of them within the network. From the point of view of atmospheric electricity two main types of föhn were found: Type I shows lowered and smooth potential gradient curves at all stations, further increased and smooth curves of conduction current, increased concentrations of small ions, etc. Föhn of Type II, amongst other characteristics, shows increased and extremely agitated curves of potential gradient and conduction current at the valley stations. Type II is observed

when there is a drifting snow at the mountain ridges south of the recording stations and mai in cases where the föhn current does not reach the bottom of the valley. Both types illustrated here by examples. Beyond this, the data obtained at the seven permanent stati during four years were reduced to "average föhn days" of both types. The observations m during föhn, however, have interest not only for our knowledge of this weather situation its but give results which are also important for studies on cloud physics (experience on cha separations caused by breaking and impact in drifting snow), on atmospheric electric a electromagnetic waves (records of stations just being in the boundary layer between fö current and positively charged upper surface of an inversion), for the investigation of ionization equilibrium and of the relations between the concentrations of small ions a condensation nuclei (there are special conditions because of the low concentrations of c densation nuclei in the föhn current and because of the increased natural radioactivity of during föhn in our region), etc. Bioclimatological points of view are mentioned, only. *Sub Headings:* **1. Electrical phenomena 2. Föhn analysis 3. Wetterstein Mts., Bavaria, Germa** —*Author's abstract.*

12.11–395 551.594.11(54

*Mani, Anna; Huddar, B. B.; Kachare, N. R. et al. (*all, Met. Office, Poona*), **Seasc variation of potential gradient in the free atmosphere at Poona during the I.G.Y.** *Ind Journal of Meteorology and Geophysics*, New Delhi, 11(3):285–294, July **1960.** 5 figs., 4 tab 5 refs. **DWB, DLC**—The variation of electrical potential gradient, measured during 1957 at Poona, is summarized for those days when thundery conditions did not prevail. The c are grouped into four periods: 1) winter (November–February), 2) summer (March–M 3) monsoon season (June–August) and 4) the period when the monsoon is withdraw (September–October). The available data is presented in tabular form and the variatio potential gradient with height for all flights, grouped seasonwise, is graphically represen *Subject Headings:* **1. Potential gradient variations 2. IGY potential gradient prog 3. Poona, India. I. Swaminathan, M. S. II. Srivastava, G. P. III. Venkiteshwaran, S** —*I.S.*

12.11–396 551.506.22:551.510.53:551.59

Imianitov, I. M., and Chubarina, E. V., **Struktura elektrostaticheskogo polia v svobo atmosfere po dannym issledovanii vo vremia Mezhdunarodnogo geofizicheskogo goda.** [structure of the electrostatic field in the free atmosphere from the evidence obtained du IGY investigations.] *Akademiia Nauk SSSR, Doklady*, 132(1):104–107, **1960.** 4 figs., ta 9 refs. **DLC**—The theory of a spherical condensor for explaining the origin of the electi field of the atmosphere is summarized, and the results of soundings of the electrical field o atmosphere carried out during the International Geophysical Year at Leningrad, Kiev Tashkent are examined in the light of the above theory. The monotonic variation of electric field gradient with height was found to be destroyed even on clear days. The m tonic increase of potential with altitude was frequently destroyed even during clear wea The most probable value of potential at 6000 m proved to be below the expected; it lay w the limits of 120 and 160 kv; the most probable value of ionospheric potential is therefore a 200–250 kv. The daily variation of potential at 6000 m is frequently not at all simila unitary variations and differs for all three points of observation. The relative variatio potential at 5000 to 6000 m has a tendency to decrease with altitude. The experimental accordingly do not confirm the hypothesis of the spherical condensor. The data ca interpreted if the hypothesis of a charged field surrounded by a total charge is assumed. earth is surrounded by a total charge whose field is superimposed upon the field of its su charge and whose fluctuations "lubricate" the fluctuations of unitary variations since fluctuations of potential aloft are produced by variations in the distribution and magnitu the total atmospheric charge. If the field potential produced by the actual charge o Earth is subtracted from the measured field then it becomes possible to determine in the approximation the field produced by the total atmospheric charge. All the regions o terrestrial sphere can be classified into three regions: I) regions of generation of the total ch II) regions where the monotonicity of variations of potential of the electric field with h

are destroyed by the total charges brought in from the region (I), and III) regions where the total charge of an entire atmosphere column is small and does not influence perceptably the field of the surface charge of the Earth. *Subject Headings:* **1. Atmosphere electric field 2. Earth's surface electric charge 3. Electrostatic field theory.**—*I.L.D.*

12.11–397 551.594.221(485)

Müller-Hillebrand, Dietrich (*Inst. för Högspänningsforskning, Uppsala*), **Askintensiteten i Sverige.** [Lightning intensity in Sweden.] *Elteknik*, Stockholm, 3(4):59–65, **1960.** 11 figs., 4 tables, 8 refs. English summary p. 1, Germany summary p. 7–8.—In Sweden there have been performed regular thunderstorm observations from the year 1730 onwards. An example of 21 years' observations during the 18th, 19th and 20th centuries shows that the annual number of thunderstorm days is subject to large variations at individual observation stations. Long periods of observations are, therefore, required for the drawing of maps showing the average values of the isokeraunic levels. A lightning counter with a sensitivity corresponding to a range of about 15 km counts about 50% more thunderstorms than an observer reports. However, this does not apply generally, but the isokeraunic levels determined on the basis of the information from the lightning counter describe a course different from those of human observations. A "thunderstorm day," according to the lightning counter, is defined in a way that at least five recordings must have occurred per day. Some examples show the geographical distribution of recorded flashes, e.g., on the 11th–12th of July, 1959, when 79 lightning counters recorded 13,302 discharges. Thirty-three stations recorded more than 150 discharges each. The thunderstorm that day covered a region of about 145,000 km². A map drawn from the results in Sweden south of the 63rd parallel of latitude shows in southern Sweden some large areas with about 1.5 lightning downstrokes to the ground per km². Certain large parts of the country were exceptionally poor in lightning with 1.5 to 0.4 flashes per km². On the average 0.57 flashes per km² were recorded for southern Sweden (Götaland, Svealand, 167,400 km²) and 0.34 flashes per km² for northern Sweden (Norrland, 243,100 km²). Two small islands in the Baltic recorded about 0.12 flashes per km². Average values recorded with the lightning counter apply to an area of 700 km² in extent. Within this limited area, by a simple mathematical analysis, a certain accumulation of lightning downstrokes may occur when each surface unit has the same chance of being struck by the flash. Definite thunderstorm gaps could not be determined, nor could a surmise put forward 27 years ago be confirmed that geological discontinuities and the geoelectrical structure of the soil result in an accumulation of downstrokes. *Subject Headings:* **1. Lightning intensity counters 2. Thunderstorm observation history 3. Sweden.**—*Author's abstract.*

12.11–398 551.594.221:697.8

Müller-Hillebrand, D. (*Uppsala*), **On the frequency of lightning flashes to high objects: a study on the Gulf of Bothnia.** *Tellus*, Stockholm, 12(4):444–449, Nov. **1960.** 8 figs., table, 10 refs., eq. **DLC**—The space-charge calculation of a lightning stroke according to GOLDE results in a simple geometrical relation between the area within which a flash strikes an object and its height. A comparison between the number of lightning strokes to chimneys and the number of lightning downstrokes per km² shows, that the statistical attraction distance of a 100 m high chimney is more than 250 m and thereby more than the leader's step-length after SCHONLAND. An explanation may be the space-charge plume, which leaves the lightning rod in a thunderstorm field and may conduct a lightning discharge to the chimney from some hundreds of meters' distance. *Subject Headings:* **1. Lightning strokes 2. Space charge plumes.** *Author's abstract.*

12.11–399 551.594.223

Tonks, L., (*Genl. Elec. Co., Vallecitos Atomic Lab., Pleasanton, Calif.*), **Electromagnetic standing waves and ball lightning.** *Nature*, London, 187(4742):1013–1014, Sept. 17, **1960.** 3 refs. **DWB, DLC**—This note gives a critical examination of KAPITZA's standing wave theory of ball lightning. The most serious difficulty for the theory lies in the magnitude of the power required. This is estimated by comparison with the power required for an electric arc in air at one atmospheric pressure. It is difficult to envisage a mechanism which could give

rise to power of the right order naturally although it might be possible to simulate the ph nomenon artificially. *Subject Headings:* **1. Ball lightning theories 2. Electromagnetic standi waves 3. Standing wave theory of ball lightning.**—*R.B.*

12.11–400 551.594.6:551.576.1:551.594.2

†Tepley, Lee R. (*Lockheed Aircraft Corp., Calif.*), **Sferics from intracloud lightning stroke** *Journal of Geophysical Research*, Wash., D. C., 66(1):111–123, Jan. **1961.** 4 figs., 2 tabl 33 refs., eq. **DLC**—It is well known that cloud-to-ground lightning strokes are prolific sourc of very low frequency (VLF) sferics. The contributions of other types of discharges, howev have been largely ignored by literature. This paper shows that intracloud lightning strol also radiate significant energy at both very low frequencies and extremely low frequenc (ELF). This conclusion is based primarily on the experimental observation that most E sferics (slow tails) are of negative polarity. From a study of a number of possible mechanis for generating negative slow tails, the following conclusions were made: (1) only the intracl stroke (specifically, the element of the discharge frequently referred to as the 'K chang is likely to be statistically important; (2) intracloud strokes also radiate significant V energy; (3) the properties of ELF sferics are uniquely suited for the study of the electri 'fine structure' of thunderstorms at many thousands of kilometers under nighttime conditio *Subject Headings:* **1. Sferics-lightning relationships 2. VLF sferics 3. Intracloud lightn strokes.**—*Author's abstract.*

ACOUSTICAL PHENOMENA (551.596)

12.11–401 551.596.1:551.57

Ando, Ichiyano and Hosokai, Matsuo, **Attenuation of acoustical properties of the sn Pt. 1.** *Studies in Fallen Snow*, Nagaoka, Japan, 4:67–74, **1952.** 19 figs., 2 refs. In Japan English summary p. 74. **Pt. 2,** *Ibid.*, 5:53–60, **1955.** 15 figs., 8 refs. In Japanese; Eng summary p. 60. **DLC** (Orientalia)—Acoustical experiments on the surface of snow v carried out using a CR oscillator as a sound source of auditory waves; cycle wave from range of 100 to 8000 ∞ distance from the range of 5 to 50 m, taking into consideration quality of snow and its weight and weather conditions as well. Figs. show the result obta from the relation between various fallen snow (cm) and its weight and attenuation (db) its comparison with attenuation done on the surface of earth in the same weather conditi Authors conclude that: 1) the less the weight of snow, the greater the increase of attenuat 2) audition by human ear was satisfactory at the level of 2000–2500 ∞ cycle. In Pt. II, degree of attenuation may be different according to the properties of the snow and the var district with regard to the amount of water contained. The measurements took place wind speed of 0–3 m with the cycles of 100, 200, 300, 500, 700, 1000, 2000, 3000, 5000, 700 and, in the use of sine wave as well as in consideration of weather condition and distance wind direction. The relationship between distance with and without fallen snow an tenuation by the human ear is shown in figures. Tentative conclusions were: 1) the maxi attenuation was made as both higher sounder and microhorn were used at the height of above the surface of snow; 2) the minimum attenuation was experienced at the cycle of 2 3000 ∞. *Subject Heading:* **1. Acoustical properties of snow.**—*K.C.*

12.11–402 551.24 551.46 551.

Gutenberg, Beno, **Low-velocity layers in the earth, ocean and atmosphere.** *Sc* Wash., D. C., 131(3405):959–965, April 1, **1960.** 7 figs. **DLC**—Under average contin the asthenosphere low velocity channel begins at the bottom of the crust. The low ve channel for transverse waves extends to a greater depth than that for longitudinal w and has a minimum depth of almost 100 mi. The asthenospheric channel is not interr at the transition from continental to oceanic regions. Low velocity layers are also found atmosphere-frequently referred to as the zone of silence. Sound waves which circle the repeatedly after large explosions correspond in principle to the channel waves. The exis of low velocity layers in the ocean was verified by DYKE and SWAINSON and EWING and ZEL. *Subject Headings:* **1. Asthenosphere channel 2. Channel waves 3. Low ve layers 4. Zones of silence.**—*E.Z.S.*

12.11–403 551.551.2:551.596.1

Jorand, M., **Note sur l'amortissement des sons dans l'atmosphère libre.** [Note on sound ttenuation in the free atmosphere.] *Journal de Mécanique et de Physique de l'Atmosphère,* Paris, 2d Ser. 2(5):39–40, Jan./March **1960.** 3 refs. **DWB**—Atmospheric turbulence makes possible to explain strong sound attenuation. The author had previously elaborated a mathematical theory for this problem, based on dimensional analysis, but owing to the irregularity of turbulence phenomenon the application of this theory to physical phenomena is very delicate. The plain use of the numerical values of the atmospheric turbulent viscosity coefficients suggested by WEILLER and FROMENT gives by far too large sound attenuations. After having analyzed this anomaly, the author shows how the scale of turbulence can be estimated approximately. *Subject Headings:* **1. Sound attenuation 2. Turbulence effects on sound 3. Acoustical propagation in lower atmosphere.**—*A. V.*

PART II. ANNOTATED BIBLIOGRAPHY ON PLANETARY ATMOSPHERES

3. JOVIAN PLANETS AND THE MOON

By: Andrew J. Meglis and Geza Thuronyi

This is the third and last in a series of bibliographies on atmospheric and other physical co tions on the planets and the Moon. The first two bibliographies in this series were published in Sept. and Oct. 1961 issues of *Meteorological and Geoastrophysical Abstracts.*

The large volume of literature on the planets and the Moon made it impossible to atte completeness and it was therefore decided to emphasize recent literature by limiting cove essentially to the period 1949–1961, and weighting it in favor of the latter part of that period.

We wish to thank R. Baker of the British Meteorological Office, S. L. Hess of Florida S Univ., L. D. Kaplan formerly of Massachusetts Institute of Technology, G. P. Kuiper of the U of California, D. W. McLeod and J. W. Salisbury of the U. S. Air Force Cambridge Research oratories, A. Vandenplas of the Institut Royal Météorologique, Belgium and others for valu suggestions related to material to be selected.

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GENERAL

12K–1 523.4:551.510.41

Hess, Seymour L., **Variation in the amounts of gaseous methane and ammonia on the visible sc of Jupiter.** (In: Flagstaff, Arizona. Lowell Observatory. **The project for the study of planetary mospheres.** Contract AF 19(122)-162, Report No. 2, Nov. 1, 1949–Jan. 31, 1950. p. 1–6.) so his: **Variation in the amount of gaseous methane on the visible disc of Jupiter.** *Ibid.*, Report o. 3, Feb. 1–April 30, 1950. p. 2–3. Also: **Variation in the amount of gaseous methane on the sible disc of Saturn.** *Ibid.*, Report No. 4, May 1–July 31, 1950. p. 1–2. **DWB**—After a series preliminary test exposures thirteen plates were exposed in the 3 prism spectrograph to various citudes and longitudes on Jupiter in order to determine the variation of methane and ammonia er the face of the planet. The object was to gain information as to relative cloud heights and lative temperatures from the ammonia absorptions. The spectrographic series was photometered d from this it was determined that the temperature falls and the cloud surface rises in passing m the center to the edges of the disc. Observations were begun to permit similar measurements Saturn's atmosphere. *Subject Headings:* **1. Planetary atmospheres 2. Jupiter 3. Saturn Methane in planetary atmospheres 5. Ammonia in planetary atmospheres.**—*Author's abstracts.*

12K–2 523.4:551.521.3

Hess, Seymour L., **Variations in atmospheric absorption over the disks of Jupiter and Saturn.** n: Flagstaff, Arizona. Lowell Observatory, **The project for the study of planetary atmospheres.**

Contract AF 19(122)-162, Annual Report, Sept. **1950.** p. 19–30.) Also in: *Astrophysical Journ* Chicago, 118(1):151–160, July **1953.** 2 figs., 4 tables, 9 refs., 9 eqs. **DWB**—The absorption methane (6190 Å band) and by ammonia (6441 Å sub-band) was investigated in spectra obtai from different points of the disks of Jupiter and Saturn. In the case of Jupiter, the cloud surf rises towards the poles and limbs and is lowest near the equator, and the temperature decrea poleward and towards the limbs. In the case of Saturn, the cloud surface is horizontal. *Sub Headings:* **1. Planetary atmospheres 2. Atmospheric absorption 3. Planetary radiation 4. Jup 5. Saturn.**—*I.L.D.*

12K–3 523.16

Smith, Harlan J. and Douglas, J. N. (*both, Yale Univ., New Haven*), **Observations of planet nonthermal radiation.** (In: Paris Symposium on Radio Astronomy, July–Aug. 1958, [**Proceedin** pub. Stanford Univ. Press, **1959.** p. 53–55. 3 figs., ref.) **DLC** (QB475.P26)—Observation Jupiter and Saturn at 23.0 Mc/s were made and are analyzed. Results indicate that Saturn doubtful though possible source of radiation; that Jupiter in the last two years has shown b occurrence probabilities roughly in the ratio 1:0.8:0.1 for frequencies 18, 21 and 23 Mc/s; and t there is good correlation between the longer pulse elements of storms over 0.8 Mc/s freque separation around 23 Mc/s and between sites separated by tens of miles. *Subject Headings:* **1. P etary radiation 2. Radio emission from planets.**—*A.J.M. and authors' conclusions.* Ⓢ

12K–4 523.

Satterthwaite, Gilbert E., **The outer planets.** *Discovery*, London, 21(1):24–30, Jan. 1 5 figs. **DLC**—This article is a systematic presentation of the following topics: orbital data, dim sions (including estimated mass, comparative density, diameter, rotational inclination and ec tricity), and physical data (including various surface-meteorological features, albedo, rotati period and also a brief history of the planet's discovery and/or planetary phenomena, e.g., Red S of Jupiter). The article concludes with a discussion of present and future work, and indicate some detail, the methods by which various present and future theories concerning physico-chem composition of the planets will be checked: visual, photographic, spectrographic and radio obse tion, positional and dynamic astronomy, color microphotometry and extraterrestrial (sate observations. *Subject Headings:* **1. Planetary research 2. Outer planets.**—*A.J.M.* Ⓢ

12K–5 523.

Struve, Otto (*Natl. Radio Astron. Obs.*), **Planets with rings.** *Sky and Telescope*, N. Y., 20(1) 23, July **1960.** photos. **DWB, DLC**—An interesting and critical discussion of manuscript by Soviet astronomer S. K. Vsekhsviatsky, **On the possible existence of a ring around Jupiter.** KHSVIATSKY'S paper deals primarily with two subjects: the likelihood of observable chang Saturn's rings and the possibility that there is a very tenuous ring of solid particles in the equat plane of Jupiter. Both topics are discussed in the light of current literature. Photograph Saturn and drawings of Jupiter nicely illustrate the discussion. *Subject Headings:* **1. Jupiter 2 turn's rings.**—*I.S.* Ⓢ

12K–6 523.164.3:52

Carr, T. D.; Smith, Alex. G.; Bollhagen, H. et al., **Recent decameter-wave-length observa of Jupiter, Saturn and Venus.** *Astrophysical Journal*, Chicago, 134(1):105–125, July **1961.** 11 9 tables, 19 refs. **DWB, DLC**—Decameter-wave-length radio observations of Jupiter, Saturn Venus have been made at a number of frequencies from both Northern and Southern hemisp of the Earth during 1959 and 1960. While the results are negative for Venus and inconclusiv Saturn, extensive nonthermal radio noise has been recorded in the case of Jupiter. The observa have permitted a redetermination to be made of the rotational period of the Jovian radio so and a statistical analysis has been made of the polarization of the noise bursts. Jupiter radio bursts showed a maximum probability of occurrence near a frequency of 18 Mc/s, with indiv pulses displaying spectral widths of less than 1 Mc/s. Over-all Jovian activity showed an in correlation with sunspot number, although there is evidence that individual noise storms m triggered by solar particles. Photoelectric observations made of Jupiter during radio-noise s showed no light-variations within the sensitivity limits of the equipment used. *Subject Hea* **1. Radio emission from planets 2. Sunspot effects on radio noise. I. Six, N. F., Jr. II. Chatt N. E.**—*Authors' abstract.* Ⓢ

JUPITER

12K–7 523.45:55

Manson, Marsden, **Circulation of the atmosphere of planets.** *Technical Society of the I Coast, San Francisco, Transactions*, 9(4):127–143, June **1892.** 5 figs. **DWB** (M1310 M289)-

author deduces a model for describing planetary circulation based on the earth's rotation and solar heating. This circulation model is then used to explain motions of the atmosphere on Jupiter. *Subject Headings:* **1. Planetary circulation 2. Jupiter's atmosphere 3. Atmospheric circulation of Jupiter.**—*A.J.M.*

12K–8 523.45:551.513:551.510.41

Panofsky, H. A. and Hess, S. L., **Notes on the meteorology of Jupiter.** (In: Flagstaff, Arizona. Lowell Observatory, **The project for the study of planetary atmospheres.** Contract Cwb-7896, Report No. 1, Jan. 1–July 1, **1948.** 20 p.) **DWB** (523.4 F574L)—This detailed report covers: dimensions of Jupiter and its atmosphere; fundamental Jovian circulation; latitudinal and time variations of the circulation (in terms of zones); ammonia and methane in the Jovian atmosphere; oscillations of great wave length on Jupiter. The report concludes with proposed plans for future study. Equations and graphs illustrate the text; derivations of two equations are appended. *Subject Headings:* **1. Jupiter's atmosphere 2. Atmospheric circulation of Jupiter 3. Ammonia in planetary atmospheres 4. Methane in planetary atmospheres.**—*A.J.M.*

12K–9 523.45:551.513.1

Panofsky, H. A. and Hess, S. L., **Jupiter.** (In: Flagstaff, Arizona. Lowell Observatory, **The project for the study of planetary atmospheres.** Contract Cwb-7896, Report No. 3, Jan. 1–June 30, **1949.** p. 6–10.) **DWB** (523.4 F574L)—Correlation between the average rotation period of the Great Red Spot and the deviations from normal of concurrent values of the westerly index on earth were computed using somewhat different averaging methods and different data sources from those in Report No. 1. Procedures are described and results discussed. Zonal accelerations of Jovian spots are also discussed and explanations of the acceleration are criticized. *Subject Headings:* **1. Jupiter's Great Red Spot 2. Atmospheric circulation of Jupiter.**—*A.J.M.*

1950

12K–10 523.45:551.513.1

Hess, Seymour L., **The general atmospheric circulation of Jupiter.** (In: Flagstaff, Arizona. Lowell Observatory, **The project for the study of planetary atmospheres.** Contract AF 19(122)-162, Annual Report, Sept. **1950.** p. 39–46. eqs., refs.) **DWB**—The principal features of the general circulation of Jupiter, namely: the "equatorial circulation" and the gradually decreasing acceleration poleward are described. SCHOENBERG'S explanation of the "equatorial circulation" by means of the equations of motion on a sphere and by the physical assumption that the energy of this acceleration is provided by the ascent of heated gases from the planet's interior at the latitudes of the north and south equatorial belts, is discussed critically. It is suggested that the exchange of air between latitudes is brought about by large scale eddies lying in horizontal planes and having vertical axes. The observed rotation period below 15° latitude corresponds to the assumption of a constant transport of vorticity; poleward the planet exhibits nearly solid rotation. The behavior of the equatorial zone is explained physically by means of temperature differences between the dark and bright equatorial belts. (*Same item as* 5.5–102, *Met. Abs.*) *Subject Headings:* **1. Planetary circulation 2. Atmospheric circulation of Jupiter 3. Jupiter's atmosphere.**—*I.L.D.*

12K–11 523.45:551.513.1

McIntosh, R. A. (*F. R. A. S.*), **Disturbance on Jupiter's south equatorial region.** *British Astronomical Association, London, Journal,* 60(8):247–250, Oct. **1950.** plate, 2 tables. **DLC** (QB1.B75)—The author relates the results of his observations of Jupiter from July to Nov. 1949, during which period there was an outburst of activity in the south equatorial belt. The paper consists largely of descriptions of the motions of spots and bright areas on Jupiter. *Subject Headings:* **1. Jupiter's atmosphere 2. Atmospheric circulation of Jupiter.**—*A.J.M.*

1951

12K–12 523.45:551.510.41:551.511.33

Lorenz, Edward N., **Thermodynamic chart for Jupiter's atmosphere.** (In: Flagstaff, Arizona. Lowell Observatory, **The project for the study of planetary atmospheres.** Contract AF 19(122)-162, Report No. 9, June 30–Sept. 30, **1951.** p. 12–20.) **DWB**—Among the constituents of Jupiter's atmosphere methane and ammonia have been identified spectroscopically. The author discusses various possibilities for an atmosphere composed, completely or in part, of these two compounds. Such items are covered as the following: phase, change of phase, effects of phase changes on pressure and temperature of the atmosphere (and vice versa), and a fairly detailed discussion of thermodynamics of the atmosphere of Jupiter. Various equations and a thermodynamic chart serve to illustrate the discussion of thermodynamics. *Subject Headings:* **1. Jupiter's atmosphere 2. Thermo-**

dynamics of the atmosphere of Jupiter 3. Ammonia in planetary atmospheres 4. Methane i planetary atmospheres.—*A.J.M.*

12K–13 551.510.4:523.4

Lorenz, Edward N., **Vertical extent of Jupiter's atmosphere.** (In: Flagstaff, Arizona. Lowe Observatory, **The project for the study of planetary atmospheres.** Contract AF 19(122)-162, Repo No. 9, June 30–Sept. 30, **1951.** p. 21–30.) Also in: *U. S. Air Force. Cambridge Research Cent Geophysical Research Papers*, No. 24:123–127, Nov. **1953.** 2 figs., 3 refs. **DWB**—It has long be recognized that Jupiter's visible surface is not a solid surface like that of the moon. Rather appears to be something drifting in the atmosphere, like a layer of clouds. Perhaps the sure evidence for this conclusion is provided by its rotation, which varies with both latitude and tim An outstanding feature is the so-called equatorial acceleration, a region extending several degre north and south of the equator whose rotation period is some five minutes shorter than that of t remainder of the planet, and whose eastward speed is therefore some 100 m/s with respect to immediate surroundings. Astrophysical evidence suggests that the atmosphere may extend to gre depths below the visible surface. There is some evidence, based upon Jupiter's observed low densit that the planet is composed largely of hydrogen. The pressures at which hydrogen would no long be gaseous could exist only at very great depths. In this note it is shown that a simple considerati of Jupiter's variable rotation period also yields a rough approximation to the depth of the atmosph below the visible surface. (*Same item as* 6.7–153, *Met. Abs.*) *Subject Headings:* **1. Jupiter's mosphere 2. Planetary atmospheric depth.**—*Author's introduction.*

12K–14 523.45:551.5

Shapiro, Ralph, **Quantitative study of bright and dark spots on Jupiter's surface.** (In: Fl staff, Arizona. Lowell Observatory, **The project for the study of planetary atmospheres.** Contr AF 19(122)-162, Report No. 7, Dec. 30, **1950**–March 30, **1951.** p. 12–28; Report No. 8, March June 30, **1951.** p. 1–2.) Also his: **The distribution and velocities of bright and dark spots Jupiter's surface in 1928.** *Ibid.*, Report No. 9, June 30–Sept. 30, **1951.** p. 1–11. The latter a issued with title **On the nature of Jovian spots as indicated by their distribution and velocities 1928** in: *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 24:115–1 Nov. **1953.** 2 figs., table, 4 refs. **DWB**—The technical details of the measurement of latitude longitude on Jupiter are described in Report No. 7 and some preliminary results are given. Dur the period March 30–June 30, 1951 some 274 more spot measurements were obtained from pho graphic plates (making a total of 378 latitude-longitude determinations). A complete analysis of new measurements was not made; however, there appeared to be rather general agreement with earlier results. 134 spot velocities were computed for the 1928 opposition of Jupiter and a so-ca synoptic map of spot velocities was constructed. Analogies are made between the Jovian equato acceleration and the terrestrial jet stream. It is proposed that Jovian spots are representat of atmospheric vortices. (*Same item as* 6.4–148, *Met. Abs.*) *Subject Headings:* **1. Atmosph circulation of Jupiter 2. Jupiter's atmosphere 3. Jupiter's markings.**—*Author's abstract.*

1952

12K–15 523.45:551

Shneider, R. G. and Shcherbo, I. A., **Iupiter v 1948 g.** [Jupiter in 1948.] *Vsesoiuznoe tronomo-Geodezicheskoe Obshchestvo, Biulleten'*, No. 11(18):26–30, **1952.** fig., 4 tables, 3 refs. **DL** Observations of Jupiter during the 1948 opposition involved the following belts: south tempe south tropical, north tropical, north temperate and both polar caps. No sharp latitudinal mot of belts and polar caps were noticed except slight displacements, broadenings and irregular inter variations presented in tables and graphs. The proper motions of all observable features in and zones were computed and tabulated. The results indicate that the proper motions of feat differ systematically in the two hemispheres, moving slower in the southern than in the nort hemisphere. *Subject Headings:* **1. Atmospheric circulation of Jupiter 2. Jupiter's markin** *S. Nowinska.*

1953

12K–16 523.45:551.510.5:55

Kliakotko, M. A., **O stroenii atmosfery Iupitera.** [Structure of the atmosphere of Jup *Vsesoiuznoe Astronomo-Geodezicheskoe Obshchestvo, Biulleten'*, No. 13(20):21–24, **1953. DLC**– structure of Jupiter's atmosphere was analyzed on the basis of observations in 1950 and of pre data. It was suggested that the dark belts make part of an upper atmospheric layer above l continuing the bright spots. The rotational velocity of the upper layers is slower than that o lower layers and the observed different zonal velocities are only optical illusions, due to va transparency of the upper atmospheric layers. The irregularity of the motion of the features c

explained by their floating up and down in layers with various angular velocities. Because of the similarity of the physical structure of the four giant planets, the same assumptions should hold for the other three giant planets. *Subject Headings:* **1. Atmospheric circulation of Jupiter 2. Jupiter's atmosphere 3. Jupiter's markings.**—*S. Nowinska.*

12K–17 523.45:551.513

Kurt, B. L., **Iupiter v ianvare-fevrale 1942 g.** [Jupiter in Jan.–Feb. 1942.] *Vsesoiuznoe Astronomo-Geodezicheskoe Obshchestvo, Biulleten'*, No. 12(19):15–17, **1953.** 2 figs., 2 tables, 2 refs. **DLC**—Some results of the analysis of Jupiter pictures taken during its 1942 opposition are presented. The pictures of the northern and southern tropical and temperate belts, as well as both polar caps, were processed by the group method. A general northward shift of the belt system was noticed. The position of the northern tropical belt was remarkable in that its southern edge was traced exactly along the equator. At present, after a correlation has been found between the velocity variations of Jupiter's features during a period of several years and the velocity of air masses on the earth, the study of proper motions of Jupiter's features attracts particular interest. It seems probable that the fluctuations of zonal circulation in the atmosphere of both planets are due to solar activity. *Subject Headings:* **1. Planetary circulation 2. Atmospheric circulation of Jupiter 3. Jupiter's atmosphere 4. Jupiter's markings.**—*S. Nowinska.*

12K–18 551.513:523.45:523.746

Shapiro, Ralph, **A planetary-atmospheric response to solar activity.** *Journal of Meteorology*, 10(5):350–355, Oct. **1953.** fig., 4 tables, 6 refs. **DWB**—From a series of photometric measurements on photographs of Jupiter's visible surface, a close relation was found between Jupiter's albedo and relative sunspot numbers. For the whole disk correlation was 0.91, increasing from 0.5–0.6 near equator to 0.75–0.8 in lat. 60°N and S. The cause of the relation is obscure; it is tentatively attributed to trigger effects of sun's ultraviolet radiation on height variations of the clouds of crystalline ammonia forming Jupiter's atmosphere. (*Same item as* 5.3–142 and 8A–41, *Met. Abs.*) *Subject Headings:* **1. Planetary circulation 2. Jupiter's atmosphere 3. Sunspot effects on Jupiter.**—*E.P.B.*

1955

12K–19 523.164.355

Burke, B. F. and Franklin, K. L. (*both, Terr. Mag., Carnegie Inst. of Washington*), **Observations of a variable radio source associated with the planet Jupiter.** *Journal of Geophysical Research*, Wash., D. C., 60(2):213–217, June **1955.** 3 figs., 2 refs. **DWB**—A source of variable 22.2-Mc/sec radiation has been detected with the large "Mills Cross" antenna of the Carnegie Institution of Washington. The source is present on nine records out of a possible 31 obtained during the first quarter of 1955. The appearance of the records of this source resembles that of terrestrial interference, but it lasts no longer than the time necessary for a celestial object to pass through the antenna pattern. The derived position in the sky corresponds to the position of Jupiter and exhibits the geocentric motion of Jupiter. There is no evident correlation between the times of appearance of this phenomenon and the reotational period of the planet Jupiter, or with the occurrence of solar activity. There is evidence that most of the radio energy is concentrated at frequencies lower than 38 Mc/sec. (*Same item as* 9A–68, *Met. Abs.*) *Subject Headings:* **1. Radio emission from Jupiter 2. Washington, D. C.**—*From authors' abstract.*

1956

12K–20 541.14:523.45:551.510.41

Rice, Francis Owen (*Dept. of Chemistry, Catholic Univ., Wash., D. C.*), **Colors on Jupiter.** *Journal of Chemical Physics*, 24(6):1259, June **1956.** table, 3 refs. **DLC** (QD1.J94)—The author presents two possible explanations of Jupiter's color changes: (1) meteorological activity causing small crystallites of material, some colored, to be whirled into the upper atmosphere, and (2) certain colored chemical compounds being formed in Jupiter's atmosphere. The author offers a list of eight reactive chemical species (found in laboratory work) which, in conjunction with short wavelength light, may be formed or kept existing in Jupiter's atmosphere or at the surface. *Subject Headings:* **1. Photochemistry of Jupiter's atmosphere 2. Planetary atmospheres 3. Color of Jupiter 4. Atmospheric circulation of Jupiter.**—*A.J.M.*

12K–21 551.510.41:523.45

Rice, Francis Owen, **The chemistry of Jupiter: the big planet's varicolored markings are an old astronomical puzzle.** *Scientific American*, N. Y., 194(6):119–128, June **1956.** 6 figs. **DWB, DLC**—The known facts about Jupiter's atmosphere and the photo-chemistry of the gases in the atmosphere resulting in the colored bands and patches, are summarized and work done by the author at Catholic

Univ. (Wash., D. C.) in the laboratory to simulate reactions on Jupiter discussed and illustrat
A table gives comparative data (temperature, albedo, density, mass, diameter, distance from s
number of moons, rotation period and rotation around sun) for 8 planets and the sun, where kno
Subject Headings: **1. Planetary atmospheres 2. Photochemistry of Jupiter's atmosphere 3. Jupit
markings.**—*M.R.*

12K–22 523.164.

Shain, C. A. (*Div. of Radiophysics, C. S. I. R. O., Univ. Grounds, Sydney*), **18.3 Mc/s radia
from Jupiter.** *Australian Journal of Physics*, Melbourne, 9(1):61–73, March **1956.** 7 figs., 7 r
DLC—Burke and Franklin's discovery of radio emission from Jupiter (*see* 12K–19, this bibl
has been confirmed. Examination of old records has shown that in 1950–51 the radiation cam
groups of bursts of very high intensity. Bursts have durations of the order of a minute or l
groups of an hour. Because of the remarkably close relation between active periods and the pe
of rotation of Jupiter, it is inferred that the source at the time was very localized. Its identificat
with a visual disturbance in the south temperate belt is very probable. It is pointed out t
occultation by Jupiter's satellites may help to locate the sources of radiation, both in position
in height relative to the visible surface, and that Jupiter radiation should be a valuable tool
studying the outer regions of the solar corona. (*Same item as* 9A–172, *Met. Abs.*) *Subject Headi
1. Radio emission from Jupiter 2. Sun's corona.*—*Author's abstract.*

12K–23 523.164

Zhelezniakov, V. V., **Radioizluchenie Iupitera.** [Radio emission from Jupiter.] *Prir
Moscow, 45(3):78–80, March **1956.** 2 figs., 3 refs. **DLC**—On the basis of non-Russian pa
dealing with radio emission from Jupiter, the author discusses the discovery of the radio emissi
the characteristics of the emission curve which resembles those obtained from thunderstorm e
tricity discharges at the earth's surface and suggests that thunderstorm and lightning may occu
the hydrogen atmosphere of Jupiter. (*Same item as* 9A–143, *Met. Abs.*) *Subject Heading:* **1. R
emission from Jupiter.**—*I.L.D.*

1957

12K–24 523.164

Barrow, C. H.; Carr, T. D. and Smith, A. G., **Sources of radio noise on the planet Jup
Nature, London, 180(4582):381, Aug. 24, **1957.** 2 figs., 2 refs. **DWB**—Daily records of Ju
radio noise on 18.0 Mc/s. Dec. 31, 1956–March 8, 1957, expressed in longitudes of central meri
suggest two sources of noise and possibly a third near the present longitude of the Red Spot. Na
band-widths suggest an ionosphere. *Subject Headings:* **1. Radio noise 2. Radio emission f
Jupiter.**—*C.E.P.B.*

12K–25 523.45:551

Squires, P. (*Div. of Radiophysics, C. S. I. R. O., Sydney, Australia*), **Equatorial clouds of Jup
Astrophysical Journal, Chicago, 126(1):185–194, July **1957.** fig., 2 tables, 4 refs., 4 eqs.
(QB1.A9)—Various hypotheses concerning the equatorial clouds of Jupiter have been discusse
the light of the observations of Hess (1953). The variations in atmospheric absorption over
disk of Jupiter lead to the view that the equatorial clouds are cumuliform; the clouds themse
consist of ammonia, probably in solid state, with tops reaching some 20–30 km above the main c
deck. It is suggested that these cloud tops are subject to some diurnal variation, sinking durin
day and rising at night. The spectroscopic measurements of ammonia indicate that the tempera
of the main deck must exceed 167°K. *Subject Headings:* **1. Jupiter's equatorial clouds 2. Amm
in planetary atmospheres 3. Temperature of Jupiter.**—*E.K.*

1958

12K–26 523.164

Barrow, C. H. and Carr, T. D. (*both, Univ. of Florida*), **Eighteen-megacycle radiation
Jupiter.** *British Astronomical Association, London, Journal*, 68(2):63–69, Feb. **1958.** 7 figs., 6
DLC (QB1.B75)—Radio observations of the planet Jupiter have been made over a period o
weeks at the beginning of 1957 using an eight-dipole aerial array. A statistical interpretation o
results indicates that the radio noise is due to two major localized sources having flux-den
greater than 8.5×10^{-20}/watt m^{-2} $(c/s)^{-1}$ with a possible smaller source. On the basis of
observations the existence of a Jovian ionosphere with an electron density of the order of 10^6/c
suggested. The observations are compared with visual observations for the same period and
Shain's results. *Subject Headings:* **1. Radio emission from Jupiter 2. Jupiter's ionosphe
Authors' abstract.

12K–27 523.164.355

Carr, Thomas D.; Smith, A. G.; Pepple, R. and Barrow, C. H., **18-megacycle observations of Jupiter in 1957.** *Astrophysical Journal*, Chicago, 127(2):274–283, March **1958.** 6 figs., 2 tables, 10 refs. **DLC** (QB1.A9)—Systematic observations at a frequency of 18 Mc/s of the intermittent radiation emitted by Jupiter have confirmed the existence of several radio sources on the planet. These sources appear to be rotating with a period 11.8 seconds shorter than the period of the System II longitudes. There is evidence that the sources are relatively fixed, perhaps to the surface of the planet. There is also good evidence that Jupiter possesses an ionosphere comparable to that of the earth. *Subject Headings:* **1. Radio emission from Jupiter 2. Jupiter's ionosphere.**—*Authors' abstract.*

12K–28 523.164.355

Franklin, K. L. and Burke, B. F. (*both, Carnegie Inst. of Wash.*), **Radio observations of the planet Jupiter.** *Journal of Geophysical Research*, Wash., D. C., 63(4, Pt. 1):807–824, Dec. **1958.** 6 figs., 3 tables, 13 refs. **DWB, DLC**—Radio observations of Jupiter made in June 1954 and Nov. 1, 1955 to March 13, 1956 are reported. Three aspects of the program are discussed: (1) correlation of observation with the rotation of Jupiter; (2) polarization of the radiation; and (3) frequency characteristics. During the period of observation, there were at least three centers of activity on the planet, rotating approximately with the nonequatorial regions. No definite correlation of radio noise with visible features was noted. The white spot DE, noted as a possible correlation in 1951 data, was definitely not well correlated with radio noise occurrences in 1955–56. The most active radio region exhibited a rotational period of $9^h\ 55^m\ 33^s$, a value consistent with other determinations and also consistent with the suggested long-term rotational period, System III. Most of the radio noise bursts were strongly circularly polarized. For the most active region, only bursts of right circular polarization were observed. The radio noise spectrum does not appear to be continuous over the observed set of frequencies. The hypothesis that the narrow angle of visibility is evidence for critical reflection by the ionosphere of Jupiter is not supported by the combined Carnegie and Australian observations. *Subject Headings:* **1. Radio emission from Jupiter 2. Jupiter's ionosphere.** —*Authors' abstract.*

12K–29 523.164.355

Gardner, F. F. and Shain, C. A. (*both, Div. of Radiophysics, C. S. I. R. O., Univ. Grounds, Chippendale*), **Further observations of radio emission from the planet Jupiter.** *Australian Journal of Physics*, Melbourne, 11(1):55–69, March **1958.** 9 figs., 2 tables, 9 refs. **DLC**—The results of further observation of Jupiter radiation, made near Sydney from June 1955 to March 1956, are presented. Most work was done at 19.6 Mc/s, but some observations were also made at 14 and 27 Mc/s. The characteristics of the 19.6 Mc/s radiation received from Jupiter are described in detail. The new facts disclosed by these observations are: (1) Jupiter radiation appeared to be random noise varying rapidly in intensity; large changes in intensity took place in times as short as 0.2 sec, but no shorter; (2) some spaced-receiver observations indicated that the terrestrial ionosphere can have a pronounced effect on the short-term characteristics of the radiation; (3) a single observation showed that on that occasion the radiation was circularly polarized (right-handed in radio sense). There appeared to be three sources of noise on Jupiter. None of these could be identified with visual features. The radiation emitted from the main source was confined to angles within 45° of a central line. The additional observations at 14 and 27 Mc/s showed that the peak intensity, mean duration, and frequency of occurrence were all greatest at 19.6 Mc/s. Two of the radio sources were active at 19.6 Mc/s but not at 27 Mc/s. The angular spread of the radiation from the principal source was considerably narrower at 27 Mc/s than at 19.6 Mc/s. The great variability and spectral concentration of the Jupiter radiation, both resembling solar noise, suggest an origin in some form of plasma oscillation in an ionized region with a critical frequency around 20 Mc/s. (*Same item as* 11.8–66, *Met. Abs.*) *Subject Headings:* **1. Radio emission from Jupiter 2. Sydney, Australia.**—*Authors' abstract.*

12K–30 523.45

Shterenshteĭn, Zh. B., **Iupiter v 1953–1954 gg.** [Jupiter in 1953–1954.] *Vsesoiuznoe Astronomo -Geodezicheskoe Obshchestvo, Biulleten'*, No. 21(28):25–29, **1958.** 3 figs., 3 tables. **DLC**—57 drawings of Jupiter based on observations made at Moscow Planetarium from Oct. 27, 1953 to April 14, 1954, were analyzed. On the basis of the analysis, tabular and graphical data are presented on latitudinal variations of bands, intensity of bands, zones and polar caps, and details (light and dark spots, etc.) within the bands. A sample map (Jan. 1, 1954) and a typical drawing of the disk of Jupiter (April 1, 1954) are also presented. *Subject Headings:* **1. Jupiter's markings 2. Moscow, U.S.S.R.**—*G.T.*

12K–31 523.164.35

†Zhelezniakov, V. V., **K teorii sporadicheskogo radioizlucheniia Iupitera.** [On the theory sporadic radio emission from Jupiter.] *Astronomicheskiĭ Zhurnal*, Moscow, 35(2):230–240, Mar April **1958.** fig., 21 refs., 15 eqs. English summary p. 230. Transl. into English in *Soviet tronomy AJ*, New York, 2(2):206–215, March/April **1958.** **DLC**—A hypothesis on the origin of sporadic radio emission from Jupiter is discussed. According to it, the bursts of emission are cau by plasma oscillations in the ionosphere of Jupiter. The plasma mechanism of radio emission explain the main peculiarities of the radio emission from Jupiter and leads to valuable informat on the physical conditions present in the ionosphere of this planet. It was found that the ionosph of Jupiter is similar to the F2 layer of the Earth's ionosphere. It is possible that the recently covered sporadic radio emission from Venus is also connected with plasma oscillations in the plan ionosphere. *Subject Headings:* **1. Radio emission from Jupiter 2. Jupiter's ionosphere 3. Venu ionosphere.**—*Author's abstract.*

1959

12K–32 523.164.355:55(

Barrow, C. H., **Latitudes of radio sources on Jupiter.** *British Astronomical Association, Lon Journal*, 69(5):211–217, Aug. **1959.** 5 figs., table, 9 refs., eqs. **DLC** (QB1.B75)—The problem determining the latitude of a radio source on Jupiter is discussed for a simplified model of the pla An experimental method is suggested. It is shown that, for the circularly polarized noise bu received, this simplified treatment is probably justified even if a magnetic field exists on Jupi *Subject Headings:* **1. Radio emission from Jupiter 2. Magnetic field of Jupiter.**—*Author's abstrac*

12K–33 523.164

Carr, Thomas D., **Radio frequency emission from the planet Jupiter.** *Astronomical Jour* New Haven, Conn., 64(2):39–41, March **1959.** 5 refs. **DLC**—The investigation of Jupiter ra tion by the several participating research groups has already yielded considerable information al the environment in which it originates. This paper summarizes such investigations and discu their significance. *Subject Heading:* **1. Radio emission from Jupiter.**—*I.S.* Ⓢ

12K–34 523.164

Epstein, Eugene E. (*Harvard Coll. Obs., Cambridge, Mass.*), **Anomalous continuum radia from Jupiter.** *Nature*, London, 184(4679):52, July 4, **1959.** table, 3 refs. **DWB**—Frank Drake, of the National Radio Astronomy Observatory, remarked that Jupiter emits anomalo large amounts of continuum radiation in the vicinity of the 21 cm wave length. Observation Jupiter were made with the Harvard 60 ft radio telescope. The results were encouraging. A si of amplitude much larger than noise fluctuation was found on most traces in the expected posi of Jupiter. The amount of emission varied with time, by as much as a factor of 2 in a period few hours. These variations are being compared with solar effects, with the low-frequency bu that are known to come from Jupiter and with the periodicities due to Jupiter's rotation. *Su Heading:* **1. Radio emission from Jupiter.**—*N.N.* Ⓢ

12K–35 523.164

†Field, George B. (*Princeton Univ. Observ.*), **The source of radiation from Jupiter at decim wavelengths.** *Journal of Geophysical Research*, Wash., D. C., 64(9):1169–1177, Sept. **1959** tables, 25 refs., 14 eqs. **DLC**—The flux of radiation from Jupiter at decimeter wave length relatively large, and is approximately independent of wave length in the interval from 3 cm to 68 Four possible sources of this radiation are proposed and discussed quantitatively. It is concl that the radiation does not originate in Jupiter's ionosphere, nor does it seem likely that it co from its atmosphere. It is not due to synchrotron radiation by cosmic ray electrons. On the o hand, electrons from the sun which are trapped in Jupiter's magnetic field may very well be source. Observations for testing whether this possibility is correct are discussed. (*Same ite* 11.9–90, *Met. Abs.*) (For Pts. 2 and 3, *see* 12K–47 and –52, this biblio.) *Subject Headings:* **1. R emission from Jupiter 2. Magnetic field of Jupiter.**—*Author's abstract.*

12K–36 538.56 523.164

Gallet, R. (*Boulder Lab., Colo.*), **Propagation and production of electromagnetic waves plasma.** *Nuovo Cimento*, Bologna, Supplement No. 1 to Ser. 10, Vol. 13, **1959.** p. 234–256. 4 3 tables, eqs. **DLC**—The production of electromagnetic waves in a plasma by thermal as we by nonthermal mechanism is surveyed. The propagation of electromagnetic waves in a plasm analyzed, considering general relations for continuous waves and for a wave packet; the ge relationships between the parameters of absorption coefficient per unit length, refractive i and their functions; and the dispersion laws. The emission of radiation from Jupiter, remainin

nigma, was studied to determine the nature of the emission, location of the sources on the planet, he planet's rotational period, and its ionosphere. Main features of Jupiter, characteristics of the adio emission with other properties deduced from observations are presented. On the emission of electromagnetic waves by plasma oscillations the possibility of the emission and the coupling mechanism permitting it are discussed, in surveying the characteristics of solar radio emission and the coupling mechanisms between plasma oscillations and electromagnetic waves. *Subject Headings:* **1. Electromagnetic wave propagation 2. Radio emission from Jupiter.**—*O.T.* Ⓢ

12K–37 523.164.355:622.2:621.396.663

McClain, E. F. and Sloanaker, R. M. (*both, U. S. Naval Research Lab., Wash., D.C.*), **Preliminary observations at 10-cm wavelength using the NRL 84-foot radio telescope.** (In: Paris Symposium on Radio Astronomy, July–Aug. 1958, [**Proceedings**], pub. Stanford Univ. Press, **1959.** p. 61–68. 5 figs., 12 refs.) **DLC** (QB75.P26)—This paper presents a detailed description of the largest steerable radio telescope in the U. S. and the preliminary observations at 10-cm wave length carried out on it. The new instrument, an 84-ft parabolic antenna, has been installed at the U. S. NRL's Maryland Point Observatory in Charles County. Several illustrations of the telescope are given. Using a radiometer a survey of the brighter radio sources is being made. This survey, although in progress, has already revealed two interesting items. First, radiation from Jupiter has been detected and second, a new rather bright source heretofore undetected at 10 cm has been measured. The details are discussed and graphically represented. *Subject Headings:* **1. Radio emission from Jupiter 2. Radio telescopes 3. Maryland Point, Md.**—*I.S.* Ⓢ

12K–38 523.45

Papazian, Harold A., **The colors of Jupiter.** *Astronomical Society of the Pacific, Publications,* 71(420):237–239, June **1959.** 10 refs. **DLC**—Recently it has been suggested by RICE that the colors of Jupiter could be due to free radicals in ices at low temperatures. Electrical storms and illumination by ultraviolet light have been suggested as mechanisms that could yield radicals. It has been shown that charged particle bombardment is a relatively simple way to produce color in normally white solid condensates. This bombardment is suggested as an alternative mechanism which might also provide an explanation of the banding of the colors. Some of the implications of this mechanism are considered briefly. *Subject Headings:* **1. Color of planets 2. Jupiter.**—*A.J.M.* Ⓢ

12K–39 523.164.355

Peek, Bertrand M., **Determination of the longitudes of sources of emission of radio noise on Jupiter.** *British Astronomical Association, London, Journal,* 69(2):70–79, Feb. **1959.** 4 figs., 3 refs., 3 eqs. **DLC** (QB1.B75)—The indication of a method whereby the longitudes of the sources of radio noise emitted by Jupiter may be determined is considered. The procedure recommended is that reception at every station where radio noise from Jupiter is being systematically studied, could be recorded simultaneously on two different frequencies. Charts similar to those shown may be expected to display the longitudes of the sources with errors not exceeding, perhaps, two or three times the errors to which visual observations are liable. *Subject Heading:* **1. Radio emission from Jupiter.**—*E.K.* Ⓢ

12K–40 523.164.355:523.45

Rishbeth, H. (*Cavendish Lab., Cambridge, Eng.*), **The ionosphere of Jupiter.** *Australian Journal of Physics,* Melbourne, 12(4):466–468, Dec. **1959.** 6 refs., 5 eqs. **DLC**—Radio-frequency emissions from Jupiter are supposed to be due to plasma oscillating in the planet's ionosphere. Radiation from Jupiter is strongest at frequencies near 20 Mc/s. The corresponding electron density is seldom approached in the terrestrial ionosphere. In 1952, KUIPER proposed a model atmosphere for Jupiter. In the terrestrial F region temperature is higher than in the stratosphere. The same may be true of Jupiter. The greater electron density in the F2 region is due to conditions which may not exist in Jupiter's atmosphere. According to BATES and MASSEY, there are two recombination processes in the terrestrial ionosphere: radiative and dissociative. The difference between the ionosphere of the Earth and Jupiter is that in the terrestrial F region the principal ion can react with neutral molecules while in the Jovian ionosphere H^+ ions can only recombine by the radiative process. Jupiter may possess an ionosphere with a critical frequency of 20 Mc/s a few hundred km above the level of visible clouds. *Subject Headings:* **1. Jupiter's ionosphere 2. Photochemistry of upper atmosphere 3. Photochemistry of Jupiter's atmosphere 4. Radio emission from Jupiter.**—*A.H.K.* Ⓢ

12K–41 523.164.355

†Roberts, J. A. and Stanley, G. J. (*both, Calif. Inst. of Tech. Radio Obs., Owens Valley*), **Radio emission from Jupiter at a wavelength of 31 centimeters.** *Astronomical Society of the Pacific, San Francisco, Publications,* 71(423):485–496, Dec. **1959.** 4 figs., 22 refs., 3 eqs. **DLC**—This is a report

of a series of observations at a wave length of 31 cm and a discussion of their implications. Th observations were made with a 90-ft equatorially mounted radio telescope between April 15 a June 17, 1959. The observed intensities are graphically represented. The paper does not arr at any definite conclusion with respect to the origin of the high-intensity decimeter radiation fr Jupiter. (*Same item as* 11L–104, *Met. Abs.*) *Subject Headings:* **1. Radio emission from Jupi 2. Owens Valley, Calif.**—*I.S.*

12K–42 523

Rutkovskaia, M. Ia., **Iupiter v 1955 godu.** [Jupiter in 1955.] *Vsesoiuznoe Astronomo-G dezicheskoe Obshchestvo, Biulleten'*, No. 25(32):19–23, **1959.** 3 figs., 3 tables, 3 refs. **DLC**—Resu of observations of Jupiter made at Moscow Planetarium from Dec. 3, 1954 to May 19, 1955 reported. Visual observations made through 5″ and 3″ Zeiss refractors were recorded in 59 drawi out of which 52 were analyzed. A sample original drawing is shown. Results of the analysis presented in tables and graphs, giving positions of bands, their displacements, and various det observed. It is found that most of the details are grouped around the two active longitudes of and 250°. *Subject Headings:* **1. Jupiter's markings 2. Moscow, U.S.S.R.**—*G.T.* Ⓢ

12K–43 523.45:547.211:535

†Teifel', V. G., **O raspredelenii intensivnosti po disku Iupitera v polosakh pogloshcheniia meta** [Intensity distribution over the disk of Jupiter in the absorption band of methane.] *Akadem Nauk SSSR. Komissiia po Fizike Planet, Izvestiia*, No. 1:93–104, **1959.** 7 figs., 3 tables, 17 re 21 eqs. Also condensed version in *Astronomicheskii Tsirkuliar*, Moscow, No. 201:3–4, April **1959.** table. **DLC**—From spectrograms of Jupiter obtained in 1958, the intensity distribut along the equator, in the north tropical band and in the central meridian was measured in the meth absorption bands $CH_4$6190 and 5430A and in the continuous spectrum. The distribution in methane bands corresponds to that in the continuous spectrum. It is suggested that the decreas band intensities toward the periphery of the disk in the nebulous layer is compensated by absorp in the thin layer of pure gas above the nebulous layer. The work of G. M. Nikol'skii (*AN A SSR. Astrofiz. Inst., Izv.*, 7:58–64, **1958**) concerning optical properties of the Red Spot is critici *Subject Headings:* **1. Jupiter's spectra 2. Methane in planetary atmospheres 2. Jupiter's G Red Spot.**—*Transl. of author's abstract.* Ⓢ

12K–44 52

Van-Allen-Gürtel auch um den Jupiter? [Van Allen Belt also around Jupiter?] *Umsc* Frankfurt a.M., 59(21):663–664, Nov. 1, **1959.** **DLC**—The planet Jupiter is a source of irreg radio frequency radiation in the meter wave region and the intensity of this radiation decre rapidly toward the short wave region. Jupiter also yields thermal radiation corresponding to 12 Recent measurements reported by Drake gave the following values:

Wave length	Temperature
3.75 cm	210°K
10 cm	600°K
22 cm	3,000°K
33 cm	10,000°K

This is nonthermal radiation. This radiation arises in the same manner as in a synchrotron result of the acceleration of charged particles in a magnetic field. In order to explain this effe the case of Jupiter, Drake assumes that the planet is surrounded by powerful radiation belts sim to those J. A. van Allen has discovered for the earth. (*Same item as* 11.8–67, *Met. Abs.*) *Su Headings:* **1. Van Allen belts 2. Jupiter.**—*I.L.D.*

12K–45 523.45:77

Vlasov, Iu. P. and Zotkin, I. T., **Fotografirovanie Iupitera s okuliarnym uvelicheniem.** [tography of Jupiter with ocular magnification.] *Vsesoiuznoe Astronomo-Geodezicheskoe Obshch Biulleten'*, No. 24(31):45–52, **1959.** 6 figs., 4 tables, 3 refs., 10 eqs. **DLC**—A camera devel by the authors to be used with an 8″ refractor is described and illustrated. Experimental ph graphs of Jupiter obtained with the instrument are discussed and reproduced. The method us calculating band widths from the photographs is explained and the band widths determine tabulated. The study established the fact that photographs with small instruments are not r inferior to drawings as far as the number of details is concerned. The use of photography w make it possible to organize a permanent service of Jovian observation. *Subject Headings:* **1. P tary photography 2. Jupiter.**—*G.T.* Ⓢ

1960

12K–46 523.45:550.38

Barrow, C. H. (*Dept. of Physics, Florida State Univ.*), **Magnetic field of Jupiter.** *Nature*, London, 188(4754):924–925, Dec. 10, **1960.** 10 refs., 6 eqs. **DWB, DLC**—Recent radio observations of Jupiter, in the frequency range 14–27 Mc/s, have suggested the presence of an ionosphere and a magnetic field on the planet. If the magnetic field is regarded as being due to a dipole situated at the centre of the planet, with its axis along the axis of rotation, a value for the polar field intensity of 7 ± 1 gauss can be found from the radio observations. *Subject Headings:* **1. Magnetic field of Jupiter 2. Radio emission from Jupiter.**—*R.B.* Ⓢ

12K–47 523.164.355

†Field, George B. (*Princeton Univ.*), **The source of radiation from Jupiter at decimeter wavelengths, Pt. 2, Cyclotron radiation by trapped electrons.** *Journal of Geophysical Research*, Wash., D. C., 65(6):1661–1681, June **1960.** 4 figs., table, 21 refs., 30 eqs. **DLC**—One of the mechanisms suggested in a previous paper which could account for the decimeter radiation from Jupiter is examined in detail (*see* 12K–35, this biblio.). A model is proposed in which nonrelativistic electrons are trapped on a magnetic surface in Jupiter's magnetic field, in analogy with the outer radiation belt of the earth. The spectrum and polarization of the cyclotron radiation emitted as the electrons move through the inhomogeneous magnetic field are calculated. The form of the spectrum ($\lambda^{\frac{1}{2}}$) compares well with the observed one, and the required electron densities are only 0.3 percent of those observed in the belt around the earth. The required magnetic field is very large—at least 1200 gauss at the poles. It is found that the polarization of the 20-Mc/s can be explained if the latitude of the emitting region is between 30° and 40°. A suggestion is made about the origin of those bursts in electrical discharges. It is shown that the large magnetic field may be primordial, owing to the high electrical conductivity throughout the planet. Observational tests related to the proposed mechanism are discussed. (For Pts. 1 and 3 *see* 12K–35 and–52, this biblio.) (*Same item as* 11.12–67, *Tel. Abs.*) *Subject Headings:* **1. Radio emission from Jupiter 2. Magnetic field of Jupiter.**—*Author's abstract.*

12K–48 523.45

Löbering, W., **Beobachtungen des grossen Roten Flecks auf Jupiter 1926–59.** [Observations of the Great Red Spot on Jupiter 1926–59.] *Die Sterne*, Leipzig, 36(1/2):21–23, Jan./Feb. **1960.** **DLC**—The author has been studying the phenomenon since 1926 and gives in this article all the details observed in the Jupiter region and on the spot itself. Literature only supplies few hypotheses concerning the nature of the spot on Jupiter. The instruments used for the observations were a Newton-mirror 20 cmϕ 1:10; a Newton-mirror 25 cmϕ 1:12; a Cassegrain 28 cmϕ 1:18. The hypothesis that the spot should be a warmer part of Jupiter's surface is rejected after the author's observations. *Subject Heading:* **1. Jupiter's Great Red Spot.**—*A.V.* Ⓢ

12K–49 523.164.355 535.51:551.521.3:523.4

Radhakrishnan, V. and Roberts, J. A. (*both, Radio Obs., Calif. Inst. of Tech.*), **Polarization and angular extent of the 960 Mc/sec radiation from Jupiter.** *Physical Review Letters*, N. Y., 4(10):493–494, May 15, **1960.** table, 7 refs. **DLC**—If the emission of intense 10 cm radiation from Jupiter has its origin in a "Van Allen belt" surrounding Jupiter, the angular extent of the source of the radiation is likely to be several times the diameter of the planet. Some degree of polarization of the radiation would be expected. These predictions are being tested with a variable-spacing interferometer, and some results are reported. The source is strongly linearly polarized, the radiation with the electric vector parallel to the equatorial plane of the planet being approximately 1.7 times as intense as in the orthogonal polarization. The radiation comes from a region several times the diameter of the disk and is more strongly polarized in the outer parts. (*Same item as* 11.12–66, *Tel. Abs.*) *Subject Headings:* **1. Radio emission from Jupiter 2. Polarization of planets 3. Van Allen belts.**—*E.Z.S.*

12K–50 523.45

Tsetkov, V. I., **Polozhenie polos i detali na Iupitere v 1957 g.** [Position of bands and details on Jupiter in 1957.] *Vsesoiuznoe Astronomo-Geodezicheskoe Obshchestvo, Biulleten'*, No. 27(34):20, **1960.** 3 figs., 5 tables, 4 refs., 4 eqs. **DLC**—Members of the Planetary Section, Moscow Division, All-Union Astron. and Geod. Soc., observed Jupiter in 1957 with a 5″ refractor and recorded their observations in 109 drawings. As a result of an analysis of these drawings, tabular and graphical data on positions and variations of bands and various details are presented, including a synoptic map of Jupiter for May 1, 1957. The most characteristic features observed are the considerable increase in the intensities of the northern tropical and southern moderate bands and the low intensity

of the southern tropical band. *Subject Headings:* **1. Jupiter's markings 2. Moscow, U.S.S.** —*G.T.* Ⓢ

1961

12K–51 523.164.

†Burke, B. F. (*Carnegie Inst. Wash. Terrestrial Magnetism*), **Radio observations of Jupiter, P** (In: Kuiper, G. P. and Middlehurst, B. M. (*eds.*), **Planets and satellites.** Chicago, Univ. of C Press, **1961.** p. 473–499. 6 figs., plate, 2 tables, 35 refs., 9 eqs.) **DWB, DLC.** Also: Ga Roger M. (*NBS, Boulder, Colo.*), **Radio observations of Jupiter, Pt. 2.** *Ibid.*, p. 500–533. 15 f 3 tables, 19 refs., 3 eqs. **DWB, DLC**—The mechanism for producing nonthermal radio noise f Jupiter is analyzed. The problems involved are: identification, localization of sources, directi properties of the radiation, scintillation effects, frequency and time dependence, polarizat problems relating to radio noise generation concern: thermal radiation, radiation of electron magnetic fields, relativistic electrons in a magnetic field and plasma oscillations. While Bu made this analysis, GALLET adopted an experimental program involving some practical problem the nature of an ionosphere other than ours and associated problems on the propagation of r waves. The types of observations are described. A survey of the principal results is presented a synopsis of the Boulder data. The discussion of the results consists of comparison of longi profiles, influence of solar activity and latitude, intrinsic properties of sources, and rotational per The fine structure of the radiation from Jupiter is determined by intensity and radiated power by pulse properties from high-speed records. As a conclusion, a simple mechanism produ Jupiter's emissions is ruled out. The solid body of the planet seems to be involved, calling reconsideration of the model of the internal structure of the giant planets, as to their internal perature, convection in the metallic core, strength of the mantle, level of the solid surface, extension of the atmosphere. Suggested are desiderata on the rotation period, comparison o longitude profiles, separation of the effect of solar activity, polarization measurements and determ tions of the magnetic field of Jupiter, dynamic spectra of the pulses, studies of various visual feat and the theory of the Jovian ionosphere. *Subject Headings:* **1. Radio emission from Jupiter 2 piter's ionosphere.**—*O.T.* Ⓢ

12K–52 523.164

Field, George B. (*Princeton Univ. Obs.*), **The source of radiation from Jupiter at decim wavelengths, Pt. 3, Time dependence of cyclotron radiation.** *Journal of Geophysical Rese* Wash., D. C., 66(5):1395–1405, May **1961.** fig., table, 11 refs., 60 eqs. **DLC**—Recent observa of the polarization, spectrum, spatial extent, and time variation of the Jovian decimeter emi are compared with the characteristics of a model based on cyclotron radiation by nonrelativ electrons trapped in a dipole field. All characteristics but the observed time variation are consi with a model in which the magnetic field strength at the equator is 0.6 gauss and that at the 1.6×10^5 gauss. The field extends to 50 Jovian radii and contains about 3×10^{-5} electrons per centimeter if the electron energy is 40 kev. The problem of time variation is considered theoreti account being taken of the effects of energy lost through radiation. In particular, the time dep ence of the spectrum is calculated for a case when the electrons are injected instantaneously w given distribution of mirror points. Solutions for arbitrary time dependence of the injection are found by superposition. The fundamental solution (for instantaneous injection) is found to c rapidly (in a few days for Jupiter) from a spectrum characteristic of initial conditions to on dependent of initial conditions. The observed spectrum of Jupiter cannot be due to the initial p because theory indicates that that phase would not last long enough; on the other hand, it cann due to the later phase, because theory indicates a much steeper spectrum than is observed. observed time variation can be reproduced theoretically by a suitable variation of electron inje but again the theoretical spectrum is much steeper than is observed. We conclude that the cycl model is ruled out by the observations. It seems possible that a model based on synchrotron emi can be made to explain the time variation while also fitting the other observed characteristics. Pts. 1 and 2, *see* 12K–35 and –47, this biblio.) *Subject Headings:* **1. Radio emission from Ju 2. Magnetic field of Jupiter.**—*Author's abstract.* Ⓢ

12K–53 523.45:55

Hide, R. (*Dept. of Physics, King's College, Univ. of Durham*), **Origin of Jupiter's Great Spot.** *Nature*, London, 190(4779):895–896, June 3, **1961.** 8 refs. **DWB**—Elementary dyn and hydrodynamic considerations are outlined in this paper which are consistent with the aut belief that the Great Red Spot is due to quite a shallow topographical feature of the solid pl The hydrodynamic theory suggests that Jupiter rotates so rapidly that the effect on the ge circulation of the atmosphere of such a topographical feature will be attenuated very slowly height and will thus make its presence manifest at the level of heavy cloud at the top of the at sphere. Such a topographical feature would need to have a horizontal dimension in excess of 4

km. Smaller features could produce the observed short-lived spots. A brief discussion is given of the atmospheric flow around the column of fluid underlying the Great Red Spot and its effect on some turbulent features of Jupiter's atmosphere. *Subject Headings:* **1. Jupiter's Great Red Spot 2. Atmospheric circulation of Jupiter.**—*R.B.* Ⓢ

12K–54 523.164.355

†Sloanaker, Russell M. and Boland, John W. (*both, U. S. Naval Res. Lab., Wash., D. C.*), **Observations of Jupiter at a wave length of 10 cm.** *Astrophysical Journal*, Chicago, 133(2):649–656, March **1961.** 5 figs., 20 refs. **DWB, DLC**—Two series of measurements of the radiation from the planet Jupiter have been made at wave lengths of 10.3 and 10.2 cm, using a radiometer and the 85-ft reflector at the U. S. Naval Research Laboratory. Measurements were made from June to August 1958, and in October 1959. The mean apparent black-body temperatures derived from the measurements are 640°±85°K standard error for the 1958 measurements and 315°±65°K standard error for the 1959 measurements. It is concluded that the observed change in intensity of about 2 to 1 between 1958 and 1959 is real and may be related to polarization of the radiation or to a correlation with solar activity. In addition, the 1958 measurements show some evidence of short-time variability, possibly correlated with the rotation of the planet. *Subject Headings:* **1. Radio emission from Jupiter 2. Planetary radiation 3. Washington, D. C.**—*Authors' abstract.* Ⓢ

12K–55 523.164.355

†Smith, Alexander G. (*Univ. Florida*), **Radio spectrum of Jupiter.** *Science*, Wash., D. C., 134(3479):587–595, Sept. 1, **1961.** 8 figs., table, 35 refs. **DLC**—This article begins with a brief sketch of Burke and Franklin's (*see* 12K–19, this biblio.) discovery of Jupiter as a radio source in 1955. The discussion then turns to the following topics concerning Jupiter: low-frequency radiation, localized radiation sources, rotation period of radio sources, details of radio outbursts, microwave radiation and possible mechanisms (to account for all observed radiation). The discussion is fairly detailed and is illustrated by several figures showing radiation-spectra recordings. Among the interesting observations presented is the fact that Jupiter does not radiate above 38 Mc/sec. *Subject Heading:* **1. Radio emission from Jupiter.**—*A.J.M.* Ⓢ

Saturn

12K–56 523.46(02)

Proctor, Richard Anthony, **Saturn and its system.** London, Longman, Green, **1865.** 251 p. 14 plates, 11 tables. **DLC** (QB671.P96)—As is common among books of this era, detail is not spared in presenting or unifying various facets of factual knowledge, "scientific" supposition or just sheer speculation. The various chapters contain discussions concerning: the discovery of Saturn—the simpler elements of orbit; false systems—modern astronomy—elements of Saturn's elliptic orbit; telescopic discoveries; the periodic changes in the appearance of Saturn's system; nature of the rings; 'the great inequality' of Saturn and Jupiter; and, habitability of Saturn. Two appendices are included; the first covers Chaldaean astronomy, Laplace's nebular theory and habitability of the Moon. The second consists, more or less, of tabular data on Saturn, the Sun, comparative planetary data and general items of interest concerning Saturn. A glossary of astronomical terms is also given. Illustrations and excellent figures are included and various trigonometric and geometric calculations are to be found throughout the book as well as a moderate amount of foot-references. *Subject Heading:* **1. Saturn.**—*A.J.M.*

12K–57 551.510:523.46

Rubashev, B. M., **Aktivnye protsessy v atmosfere Saturna.** [Active processes in the atmosphere of Saturn.] *Priroda*, Moscow, No. 5:51–52, May **1951.** 15 refs. **DLC**—Disturbances in Saturn's atmosphere in 1949 are discussed. Author points out that 1949 is second to 1947 as a year of high solar activity, and that the current epoch is a maximum epoch of its secular cycle; he describes the unusual phenomena: brightness of the equatorial zone, nearly white spots, light shades, dark spots between the chronographic latitudes −10° and −30°, thin strip the whole length of the equatorial belt, etc. Emphasis is placed on Saturn's rings, similar phenomena of which were observed in 1898. Appearance of white spots was recorded in 1933, in 1903, and in 1870. The intervals of about 30 years coincide with the period of Saturn's rotation around the sun (29.46 years). Thus the author has indicated two possible causes of increase in activity. (*Same item as* 4.4–23, *Met. Abs.*) *Subject Headings:* **1. Saturn's atmosphere 2. Saturn's rings.**—*A.M.P.*

12K–58 523.46:523.035.2

Bobrov, M. S., **Vyvod teoreticheskoĭ fazovoĭ funktsii iarkosti kolets Saturna i sravnenie ee s nabliudeniiami.** [Derivation of the theoretical phase function of the brightness of Saturn's rings

and its comparison with observations.] *Astronomicheskiĭ Zhurnal*, Moscow, 36(1):129–133, Ja
Feb. **1959.** 2 figs., 2 tables, 8 refs., 10 eqs. Transl. in *Soviet Astronomy AJ*, New York, 3(1):13
135, Jan./Feb. **1959.** **DLC**—A formula is derived which gives the dependence between the surfa
brightness of a flat layer composed of macroscopic spherical particles and the phase angle during t
illumination of the layer by a distant source of finite angular dimensions. It is assumed that t
influence of diffraction is negligibly small. The results are applied to the B-ring of Saturn. It
shown that the theoretical phase curve is in good agreement with the observational data of SCHOE
BERG and LEBEDINETS. *Subject Headings:* **1. Saturn's rings 2. Brightness of Saturn.**—*Autho
abstract.* Ⓢ

12K–59 523.46:523.03

Bobrov, M. S., **O znachenii absoliutnoĭ iarkosti kol'tsa B Saturna.** [On the absol
brightness of the B-ring of Saturn.] *Astronomicheskiĭ Zhurnal*, Moscow, 36(5):863–8
Sept./Oct. **1959.** 2 tables, 7 refs., 2 eqs. Transl. in *Soviet Astronomy AJ*, New York, 3(5):839–8
March/April **1960.** **DLC**—The results of photographic photometry reported by V. N. LEBEDINE
pertaining in part to the B-ring of Saturn, are discussed herein. It is shown that the value 0
obtained by LEBEDINETS for the absolute brightness $b_B(0)$ of the most intense region of the B-r
in the ansae at opposition is underestimated, since systematic errors due to photographic irradiat
and nonlinearity of the phase curve of the Saturnian ring were not duly taken into account. Red
tion of the measurements reported by LEBEDINETS for those errors results in a value $b_B(0) = 0$
$\pm 15\%$. *Subject Headings:* **1. Saturn's rings 2. Photometric observation techniques 3. Brightn
of Saturn. I. Lebedinets, V. N.**—*Author's abstract.* Ⓢ

12K–60 523.46:523.03

Bobrov, M. S., **Teoreticheskie fazovye krivye tenovogo effekta na kol'tsakh Saturna, I, Vy
formul.** [Theoretical phase curves of the shadow effect on Saturn's rings, Pt. 1, The derivation of
formulas.] *Astronomicheskiĭ Zhurnal*, Moscow, 37(2):306–316, March/April **1960.** 5 figs., ta
14 refs., 43 eqs. Russian and English summaries p. 306. Transl. into English in *Soviet Astron
AJ*, New York, 4(2):288–297, **1960.** **DLC**—SEELIGER's theory of the shadow effect on Satu
rings is found to be at variance with observational data. SCHOENBERG's attempt to explain
phase curves of the rings in terms of diffraction encounters the objection that diffraction scatte
is not an agency capable of bringing about the observed high-level brightness of the *B* ring.
extent of the sun's disc (about 3°.5 when seen from as far out as Saturn), when taken into acco
in the theory of the shadow effect, effects a radical change in the results of the theory, and opens
the possibility of bringing them into harmony with observational data. A decisive test of
application of shadow theory to Saturn's rings is provided by a comparison of theoretical ph
curves, calculated on the basis of the theory and observed phase curves. The author has done
work and found excellent agreement for reasonable values of the parameters in the formulas u
The present article contains a detailed derivation of the dependence of the quantity $b_{1\alpha}/b_{10}$ on p
angle α, where b is the brightness of a plane layer of macroscopic particles illuminated by a dist
source, the latter of angular radius ϕ; subscript 1 means that only first-order scattering effects
taken into account, while subscripts α and zero denote brightness at phase angle α and at the mom
of exact opposition, respectively. Equations (16), (27), (28), (32), (33) and (34) are approxi
solutions to the problem, with a deficiency, in that penumbral effects are completely disregar
while (40)–(43) yield approximate solutions with an excess (the penumbra being assumed to
full umbra). The reduction of higher-order scattering constitutes a small correction applied to
results derived from these equations; it will appear in a later paper as the reduction for the pr
phase coefficient of the particles. *Subject Headings:* **1. Saturn's rings 2. Brightness of Satur
Author's abstract.** Ⓢ

12K–61 523.46:523.0

Bobrov, M. S. (*U.S.S.R. Acad. Sci., Moscow*), **Some remarks on optical properties of Satu
rings.** *Astronomical Journal*, New Haven, Conn., 65(5):337–338, June **1960.** 15 refs., 3
DLC—Some optical properties of Saturn's rings are discussed in connection with the papers of H
FRANKLIN and A. F. COOK (1958). Special attention is paid to the objection of these auth
BOBROV's conclusion about nondiffractional character of the light scattering by B-ring. It is sh
that this objection is unfounded. *Subject Heading:* **1. Saturn's rings.**—*Author's abstract.* Ⓢ

NEPTUNE, URANUS

12K–62 551.510.41:546.11:523

Herzberg, G. (*Ottawa, Canada*), **Spectroscopic evidence of molecular hydrogen in the at
pheres of Uranus and Neptune.** *Astrophysical Journal*, 115(3):337–340, May **1952.** fig., t

refs. **DLC**—The unidentified diffuse feature at 8270 Å observed by KUIPER in the spectra of Uranus and Neptune is reproduced in the laboratory in an 80 meter path of hydrogen at 100 atm pressure and a temperature of 75°K. It is the S(0) line of the 3–0 pressure-induced rotation-vibration band of the H_2 molecule. Two other lines of this band, as well as three lines of a double transition (2–0, 1–0), are observed in the laboratory spectrum. Most of these features are hidden in the planetary spectra by strong CH_4 bands, but a line 8166 Å, of the double transition is only partially overlapped by an adjacent CH_4 band. Its low intensity in the planetary spectra can be accounted for by assuming that there are even larger amounts of helium than of hydrogen in the atmospheres of Uranus and Neptune. Helium does not induce the double transition. The observed spectra are very roughly compatible with a 3:1 (or higher) helium-hydrogen ratio, a temperature of 78°K (or lower), and a partial pressure of hydrogen at the bottom of the visible atmosphere of about 2 atm. The thickness of an equivalent atmosphere of uniform density would be about 18 km for Uranus. (*Same item as* 4.7–56, *Met. Abs.*) *Subject Headings:* **1. Planetary atmospheres 2. Molecular hydrogen 3. Uranus 4. Neptune.**—*Author's abstract.*

12K–63 551.521.12:523.47/8:523.035.2

Hardie, R. H. and Giclas, H. L. (*both, Lowell Obs.*), **A search for solar variation.** *Astrophysical Journal*, Chic., 122(3):460–465, Nov. **1955.** fig., 4 tables, 9 refs., eqs. **DWB, DLC**—Photometric observations of Uranus and Neptune made from 1949 to 1954 are presented and discussed in relation to possible variations in the visible solar radiation. These point to the unlikelihood of any variations in excess of about 0.004 mag. during this time. The techniques which have been used to attain high accuracy are described. (*Same item as* 11.5–108, *Met. Abs.*) *Subject Headings:* **1. Solar radiation variations 2. Brightness of planets.**—*Authors' abstract.*

PLUTO

12K–64 523.482

Walker, Merle F. and Hardie, Robert (*both, Lowell Obs.*), **Photometric determination of the rotational period of Pluto.** *Astronomical Society of the Pacific, San Francisco, Publications*, 67(397): 224–231, Aug. **1955.** 3 figs., 3 tables, 5 refs. **DLC**—This paper is based on observations carried out during 1953, 1954 and 1955. Photometric observations on successive nights showed that a periodic variation in the light of the planet does indeed occur, with a range of about 0.1 mag. and a period between 6.0 and 6.5 days. The evaluation of all the data leads to the period of rotation 6.390 days with an estimated accuracy of ±0.003 day. *Subject Heading:* **1. Pluto.**—*E.K.*

12K–65 523.482

Gingerich, Owen, **The solar system beyond Neptune.** *Scientific American*, N. Y., 200(4):86–90, April **1959.** 5 figs. **DWB, DLC**—This article treats the following topics concerning Pluto: history of discovery; anomalies in expected properties (diameter-mass-albedo); speculation as to Pluto's role in the solar system (independent planet or satellite of Neptune?); protoplanet theory of the genesis of solar system as related to Pluto's role in the solar system and, finally, difficulties in searching for further planets of magnitudes 16 to 20 and beyond. (*Same item as* 11.12–173, *Met. Abs.*) *Subject Headings:* **1. Pluto 2. Origin of solar system.**—*A.J.M.*

12K–66 523.482

Antalová, A. and Antal, M. (*Astron. Inst., Slovak Acad. of Sci.*), **The observations of Pluto in 1959.** *Bulletin of the Astronomical Institutes of Czechoslovakia*, Prague, 11(6):231–232, **1960.** 2 tables, 4 refs. Russian summary p. 231. **DLC**—The planet Pluto was photographed at the Skalnaté Pleso Observatory in Jan.–May 1959, with a Newtonian reflector of aperture 60 cm and focal length 130 cm. Seven positions were obtained and compared with data of the American Ephemeris. Deviations are indicated, $+0^s.65 \pm 0^s.01$ in right ascension and $0''.0 \pm 0''.1$ in declination for March 1959. A table contains the topocentric positions for Pluto for the equinox 1950-0, numbers of the reference stars and their dependencies. The topocentric positions were converted into geocentric ones and the residuals O–C to the interpolated ephemeris values were formed. The horizontal parallaxes and the residuals in equatorial coordinates for each observation are shown in another table. *Subject Heading:* **1. Pluto.**—*E.Z.S.* Ⓢ

12K–67 551.482/3

Tombaugh, Clyde W. (*New Mexico State Univ.*), **The trans-Neptunian planet search.** (In: Kuiper, G. P. and Middlehurst, B. M. (*eds.*), **Planets and satellites.** Chicago, Univ. of Chicago Press, **1961.** p. 12–30. 2 figs., 14 refs., eq.) **DWB, DLC**—Early investigations of trans-Neptunian planets and early work at Lowell Observatory are surveyed. An extensive survey began April 1, 1929 with the completion of the 13-in. telescope. The telescope, the method of search, the checking of "planet suspects," the discovery of Pluto, the completion of the main program, by-products of

planet search, and statistics of the survey are discussed. *Subject Headings:* **1. Outer pla 2. Pluto.**—*O.T.* Ⓢ

Moon

1949

12K–68 52

Lyot, Bernard and Dollfus, Audouin, **Recherche d'une atmosphère au voisinage de la L** [Search for an atmosphere in the vicinity of the Moon.] *Académie des Sciences, Paris, Co Rendus*, 229(24):1277–1280, Dec. 14, **1949.** fig., 14 refs. **DLC**—A new technique, based on met applied by Russel in 1926, has been used to detect the lunar atmosphere. The observation not reveal an atmosphere; considerations are presented, however, concerning the limits of brigh and density which would enable determination of the existence of a lunar atmosphere. *Su Heading:* **1. Lunar atmosphere.**—*E.K.*

12K–69 523.32:523.1

Piddington, J. H. and Minnett, H. C. (*both, Div. of Radiophysics, C. S. I. R. O.*), **Micro thermal radiation from the Moon.** *Australian Journal of Scientific Research, Ser. A*, Melbo 2(1):63–77, March **1949.** 5 figs., table, 10 refs., 5 eqs. **DLC** (Q1.A773)—Measurements have made of the thermal radiation from the Moon in a 15 Mc/s band, centered at 24,000 Mc/s. radiation from the whole lunar disk has been measured during several phase cycles. Tempera corresponding to this radiation have been deduced and curves of temperature against phase drawn. One of these corresponds to average temperature over the disk and the other to the perature of a point on the lunar equator. They are found to be approximately sinusoidal, amplitude ±40.3°K and ±52.0°K, respectively, and with a phase lag behind the lunar phase an about 45° in each case. These results conflict with previous measurements of temperature at infra-red wavelengths in both amplitude and phase angle of the temperature curve. An explan is given in terms of radiation from subsurface layers of the Moon's crust, which are partially t parent to the electromagnetic waves with which we are dealing. The theory is developed titatively and it is found that the results are consistent with the existence of a thin layer of covering a solid lunar surface. Estimates are made of the temperatures of the disk of the new (156°K) and of the deep interior (241°K). *Subject Headings:* **1. Thermal radiation of 2. Lunar temperatures 3. Radio emission from Moon 4. Lunar dust layer.**—*Authors' abstra*

1950

12K–70 5

Jaeger, J. C. and Harper, A. F. A., **Nature of the surface of the Moon.** *Nature*, Lo 166(4233):1026, Dec. 16, **1950.** fig., 4 refs., 2 eqs. **DLC**—Calculations in connection wit microwave observations of Piddington and Minnett (*see* 12K–69, this biblio.) lead to values correspond to the terrestrial values for substances such as pumice, or gravel, and suggest tha surface of the Moon consists of granular matter interspersed with dust which lies on top of i depth of about 2 mm. The observed temperature is an average over a small region of the su and it is possible that part of the region may be covered with bare rock and the remainder with It is unlikely that more than 5% of the surface is bare rock. *Subject Headings:* **1. Moon's s 2. Lunar dust layer.**—*E.K.*

12K–71

Raimond, J. J., Jr., **De temperatuur van de maan.** [The temperature of the Moon.] *Ha Dampkring*, 48(5):81–84, May **1950.** 2 figs. **DLC**—By measuring radiations in the near in (not absorbed by CO_2 as infrared are) the following surface temperatures have been determin various phases of the Moon: center of full Moon 100°C, center of the new Moon −150°C, a −24°C and interior −50°C, or −60°C. Methods used by Piddington and Minnett (*see* 12 this biblio.) in Australia are described and illustrated. (*Same item as* 9–75, *Met. Abs.*) *Heading:* **1. Lunar temperatures.**—*M.R.*

1951

12K–72 551.521.9:523.32

Lettau, Heinz, **On the heat budget of the moon and the surface temperature variation d lunar eclipse.** *Geofisica Pura e Applicata*, 19(1–2):1–18, Jan.–March **1951.** 3 figs., 4 tables, 42 eqs. English summary p. 1. **DLC**—In order to determine the micro-meteorological con of temperature and radiative balance on the surface of the Moon, the author develops three theo models based on the assumption that the surface material on the moon is homogeneous but first case there is no variation of thermal properties with depth, in the second the variation is

th depth and in the third case varies only with time. The results of the theoretical models are sted against data obtained by PETTIT (1940) during the lunar eclipse of Oct. 27, 1939 and it is und that the best fit is obtained by assuming that the surface of the Moon is covered with some ghly porous material such as volcanic ash from .2 to 1.0 m thick, or rock .5 m thick. During totality nditions approximate those which would occur with the second model. PIDDINGTON and MINNETT ee 12K–69, this biblio.) estimated that there was a dust layer .4 m thick, by studying microwave ermal properties of the Moon. (*Same item as* 2.8–76, *Met. Abs.*) *Subject Headings:* **1. Radiation lance of Moon 2. Lunar temperatures 3. Moon's surface.**—*M.R.*

12K–73 523.34:523.035.313

Markov, A. V., **Obrazovanie rel'efa i fizicheskie svoïstva lunnoï poverkhnosti.** [Formation the relief and physical properties of the surface of the Moon.] *Priroda*, Moscow, No. 9:12–20, pt. **1951.** 7 figs., 27 refs. **DWB**—A major popular article, giving many details of present day owledge of morphology, physiography, soil or rock formations, radiative characteristics (albedo), mate, etc. of the Moon. (*Same item as* 4.5–243 and 8G–86, *Met. Abs.*) *Subject Headings:* **Albedo of Moon 2. Lunar atmosphere 3. Moon's surface.**—*M.R.*

12K–74 523.32

Möller, F., **Die Temperatur der Mondoberfläche.** [The temperature of the Moon's surface.] *itschrift für Meteorologie*, 5(5/6):185–189, May/June **1951.** fig., 8 refs., 5 eqs. *Also:* [**Comment** .] Kurt Wegener and [**Reply by**] Möller in *Ibid.*, 6(5):147–148, May **1952.** fig. **DWB**—MÖLLER cusses the radiation balance of the moon on the basis of astronomically observed temperatures of 134 to −154°C. Equilibrium is not reached during Moon's night so that heat conductivity of the ound must be lower than that of dry quartz sand. (*Same item as* 4.5–245, *Met. Abs.*) WEGENER akes a comparison between the heat exchange of the earth and space and of the Moon and space. is concluded that the diurnal temperature at the surface of the Moon is sinusoidal and the minimum nperature is attained a few minutes after sunset and that the temperature exchange between the on and space is solely radiational so that the night temperature at the surface of the Moon is ermined by the radiation balance between the surface of the Moon and space. On p. 148, MÖLLER ticizes the assumption of a radiational equilibrium in the stratosphere since available data on sorption spectra indicate that such a simple equilibrium does not exist. Moreover, the fact that temperature of the Moon at night is above absolute zero indicates that there is heat exchange conduction also and not by radiation alone. (*Same item as* 4.1–138, *Met. Abs.*) *Subject Head-s:* **1. Lunar temperatures 2. Stratospheric temperatures 3. Radiation balance in space.**—*E.P.B. & I.L.D.*

1952

12K–75 523.35:523.035.313

Dollfus, Audouin, **La courbe de polarisation de la terre et la nature du sol lunaire.** [Polarization ve of the earth and properties of the lunar soil.] *Académie des Sciences, Paris, Comptes Rendus*, 6(18):1013–1016, Nov. 3, **1952.** 2 refs. **DWB**—The polarization curve of light reflected by the on makes it possible to determine that of the Earth, leaving only a factor which was calculated combining the polarization of the atmosphere, of the soil and of clouds. Laws of this integration e investigated by means of aerostat measurements. The depolarization coefficient of the lunar face is a function of albedo and corresponds to that of volcanic ash. (*Same item as* 6.10–277, *Met. Abs.*) *Subject Headings:* **1. Polarization of light from Moon 2. Polarization measuring uipment 3. Albedo of Moon 4. Lunar atmosphere.**—*Transl. of author's abstract.*

12K–76 523.35

Khabakov, A. V., **O nalichii v proshlom sledov atmosfery u sputnika zemli.** [On the presence the past of traces of an atmosphere on the Moon.] *Vsesoiuznoe Geograficheskoe Obshchestvo, estiia*, 84(3):315, May/June **1952.** 6 refs. **DLC**—The author reiterates his previous conclu-ns based upon photographs of the lunar surface taken with ultraviolet and range filters, that color des of certain regions are traces of chemical weathering and also of oxidation as a consequence he liberation of gases during eruption and hence the reddish color is evidence of the past presence ases and water on the Moon. (*Same item as* 4.6–254, *Met. Abs.*) *Subject Heading:* **1. Lunar osphere.**—*I.L.D.*

12K–77 523.3

Moore, Patrick A., **What we know about the Moon.** *British Interplanetary Society, Journal*, 1):19–40, Jan. **1952.** photos. **DLC**—Present knowledge concerning the Moon, its surface, fications of an atmosphere, possibility of life, the side averted from the Earth, etc., is summed up. hotograph showing the eastern half of the Moon and drawings of details of the satellite's surface

are presented. In discussing the possible existence of a lunar atmosphere, the author points out t most of the atmosphere which probably existed on the Moon at an earlier stage of development " now leaked away into space." A very tenuous atmosphere, however, possibly still exists, as see to be indicated by lunar "twilight" (which is difficult to distinguish from "earthshine"), by occu tion of planets, by grey borders to black shadows in craters and by meteor flashes recently repor The author further points out that the existence of lunar mists is established beyond doubt but t water is certainly lacking on the Moon. (*Same item as* 4.5–244, *Met. Abs.*) *Subject Headi* **1. Moon 2. Lunar atmosphere.**—*G.T.*

1953

12K–78 52

Jaeger, J. C. (*Australian Natl. Univ., Canberra*), **The surface temperature of the Moon.** *A tralian Journal of Physics*, Melbourne, 6(1):10–21, March **1953.** 7 figs., 2 tables, refs. **DL** Results of numerical calculations are given for (1) the fall in surface temperature during a lu eclipse, (2) the variation in surface temperature at the equator during a lunation, and (3) the varia in microwave temperature at the equator during lunation. These calculations are made on assumption that heat is lost from the surface by radiation according to the fourth power law. models are considered, firstly, that in which the surface material of the moon is homogene and secondly, that in which it consists of a thin skin of poor conductor on a better conducting stratum. The experimental results are discussed in the light of these calculations and it is fo that none of the proposed models fits them all adequately, and, though there is a slight prefer for the thin skin model over the homogeneous solid, it is not possible to discriminate between two on the information at present available. (*Same item as* 12.1–123, *Met. Abs.*) *Subject Head* **1. Lunar temperatures 2. Lunar eclipses.**—*Author's abstract.*

12K–79 523.32:551.521.9:53

Jaeger, J. C. (*Australian Natl. Univ., Canberra*), **Conduction of heat in a solid with per boundary conditions, with an application to the surface temperature of the Moon.** *Camb Philosophical Society, Proceedings*, Pt. 2, 49:355–359, April **1953.** fig., table, 5 refs., 11 eqs. **D** A numerical method is developed for the solution of the heat conduction problem assuming tha surface temperature is a periodic step function. Twenty intervals give sufficient accuracy. A ing the theory to the temperature of the Moon at the equator during a lunation, the author concl that the Moon must be covered by fine dust. Furthermore, it is shown how to compute the effe temperature of the lunar surface for observations by radio microwaves. (*Same item as* 6.6 *Met. Abs.*) *Subject Headings:* **1. Lunar temperatures 2. Heat conductivity 3. Lunar dust** —*A.A.*

12K–80 52

Sabaneev, P. F., **O proiskhozhdenii lunnykh tsirkov.** [Origin of the lunar cirques.] *Vse noe Astronomo-Geodezicheskoe Obshchestvo, Biulleten'*, 13(20):7–20, **1953.** 17 figs., tables, **DLC**—The origin of the Moon's rugged surface, quite incomparable in its structure with that Earth, was investigated. It was concluded from many tests with falling bodies, that the cirques originate from the falling of round, dense masses of fast-moving material on the lunar su The large cirque dimensions and matter ejected at long distances indicate the falling of large under an oblique angle. Hence the author postulates the existence of a great number of small satellites in the past, orbiting near the Moon and being captured by the latter's gravity and f on its surface, thus producing the lunar cirques and craters. *Subject Headings:* **1. Lunar topog 2. Lunar craters.**—*S. Nowinska.*

1955

12K–81 523.164.42:523.991.2:

Elsmore, B. and Whitfield, G. R., **Lunar occultation of a radio star and the derivation of an limit for the density of the lunar atmosphere.** *Nature*, London, 176(4479):457–458, Sept. 3, 2 figs., 6 refs. **DWB**—On April 26, 1955, the moon occulted the radio source in Gemini. Ob tions at Cambridge, Eng., on 7.9 and 3.7 m suggest that the density of the lunar atmosph $<10^{-12}$ of Earth's atmosphere at sea level. On sunlit side ionization is as great as in F (*Same item as* 9A–72, *Met. Abs.*) *Subject Headings:* **1. Lunar atmosphere 2. Radio star occu 3. Radio observation of lunar atmosphere 4. Cambridge, Eng.**—*C.E.P.B.*

12K–82

Öpik, E. J., **The density of the lunar atmosphere.** *Irish Astronomical Journal*, A 3(5):137–143, March **1955.** 7 refs., 8 eqs. **DLC.** Reprinted as *Armagh, Ireland. Obser Leaflet*, No. 19. **DWB**—Estimates of the density of the lunar atmosphere made from various vary from 1/12,000 that of the terrestrial (Lipskiĭ, 1953) to 1/1,300,000 that of the Earth. C

tions by the author, using the surface brightness of the earth-shine at quarter phase, give a value of 1/226,000 that of the terrestrial for the mass, and probably "pressure or density of 1/1.3 million that of the Earth." (*Same item as* 12.1–124, *Met. Abs.*) *Subject Heading:* **1. Lunar atmosphere.**—*M.R.*

12K–83 523.34

†Urey, Harold C. (*Univ. of Chicago*), **The origin and significance of the Moon's surface.** (In: Beer, Arthur (*ed.*), **Vistas in astronomy.** pub. London, **1955–1956.** Vol. 2:1667–1680. fig., 52 refs.) **DLC, DWB** (520.82 B415v)—Some sixty years ago G. K. GILBERT wrote a remarkable paper on the structure and origin of the Moon's surface, and subsequent students of the subject with various scientific backgrounds have come to similar conclusions, often without knowing of the previous work. GILBERT'S ideas and those of other investigators are reviewed and some new points are added. It is contended that the Moon was formed at predominantly low temperatures, that the face of the Moon was fashioned mostly at the terminal stage of its formation and during a period of 10^5 years or less, that it was always at a distance substantially greater than the Roche limit, and that the craters, mountains, and maria are mostly the result of collisions of satellites of the earth-moon system with its surface. (*Same item as* 10.3–100, *Met. Abs.*) *Subject Headings:* **1. Moon's surface 2. Origin of Moon 3. History of the Moon.**—*Author's abstract.*

12K–84 523.39

Wilkins, Hugh Percy and Moore, Patrick, **The Moon: a complete description of the surface of the Moon, containing the 300-inch Wilkins lunar map.** New York, Macmillan, **1955.** 388 p. figs., maps, photos. **DLC** (QB581.W56)—The introductory section discusses the history of selenography, lunar surface details, changes on the Moon, present condition of the Moon, and classification of lunar detail. Following this discussion is a key map in which the Moon's linear surface is divided into 25 quadrangles; this map serves as an index to the following 25 sections which describe the features found in each particular quadrangle in great detail. Within these sections the features are listed alphabetically with coordinates for locating the feature, brief reference to the man for whom feature was named and, lastly, a description of the feature. These 25 detailed sections form the bulk of this book. Appendices include: lunar photography; lunar maps; measurement of lunar altitudes; legends, myths, superstitions and traditions; and lunar observers of the past and present. An index to formations in the lunar map, as well as a general index, is provided. A brief bibliography is also given. *Subject Headings:* **1. Lunar topography 2. Lunar maps.**—*A.J.M.*

1956

12K–85 523.164.42:523.991.2:523.35

Costain, C. H.; Elsmore, B. and Whitfield, G. R., **Radio observations of a lunar occultation of the Crab Nebula.** *Royal Astronomical Society, Monthly Notices,* 116(4):380–385, **1956.** 4 figs., 8 refs. **DLC** (QB1.R7)—Observations were made at wave lengths of 3.7 m and 7.9 m of the lunar occultation of the Crab Nebula on Jan. 24, 1956. At 3.7 m, observations were made throughout the occultation, and the distribution of radio brightness across the nebula was derived. The position of the radio source agrees closely with that of the optical nebula but its size is somewhat larger. At 7.9 m, severe man-made interference occurred during the emersion but observation of the immersion suggested that at this wave length the source was considerably more extended. Recent optical evidence has suggested that the emission from the Crab Nebula is due to the acceleration of high energy electrons in weak magnetic fields; a variation of the spectral distribution of the radio emission from centre to limb may be associated with a radial variation in the energy spectrum of the high energy particles or of the magnetic field. By comparing the time of obscuration at 3.7 m with the computed value, an estimate was made of the refraction occurring in the lunar atmosphere; an electron density at the Moon's surface of 10^4 cm^{-3} was derived, a figure which corresponds to a surface density of the lunar atmosphere about 10^{-13} of that of the Earth's. *Subject Headings:* **1. Radio star occultation 2. Lunar atmosphere 3. Crab nebula 4. Radio observation of lunar atmosphere.**—*Authors' abstract.*

12K–86 551.521.6:551.593.5:535.37:523.32

Kozyrev, Nikolai A., **Liuminestsentsiia lunnoĭ poverkhnosti i intensivnost korpuskuliarnogo izlucheniia Solntsa.** [Luminescence of the lunar surface and intensity of corpuscular radiation of the Sun.] *Akademiia Nauk SSSR. Krymskaia Astrofizicheskaia Observatoriia, Izvestiia,* 16:148–158, **1956.** 5 figs., table, 8 refs., 11 eqs. **DLC.** English transl. by F. Holden issued by American Meteorological Society under Contract AF 19(604)-1936, as its T-R-222. 10 p.—The author proves that the luminescence of the Moon is due to corpuscular radiation from the Sun. Spectrograms of different parts of the Moon's surface in the autumn of 1955 were made at the Crimean Astrophysical Observatory and, when possible, the solar spectrum was taken for comparison. Study

was made of the surfaces of the Moon's maria, the mountainous part of the central portion of th Moon, the bottoms of certain craters and Wood's spot. These investigations gave a negative resul the contours of the lines H and K proved to be identical with those of the solar spectrum. Onl the crater Aristarchus, together with the adjacent Herodotus taken as an example of a ray syste showed a decidedly different contour for these lines. In the spectrum of Aristarchus the centr part of the H and K lines looks narrower than in the solar spectrum. Results of spectrograph investigations of the ray system Aristarchus-Herodotus are discussed and shown in figures. Fo mulas are worked out to determine the energy of the radiation of the sun and are applied to the ca of the maximum luminescence of the crater Aristarchus on Oct. 4, giving: $E=(A/nQ)\cdot 1.6\times 10^4$ erg cm^{-2}/sec^{-1} where E =energy of the radiation of the sun; A =reflecting capacity of the moon's surfac n =fraction of the area which is occupied by the bright luminescent substance on the visible surfa of the crater; Q =coefficient of the energy output of luminescence. Hence the energy causing t luminescence is very considerable and is of the order of 1% of the solar constant ($S=1.32\cdot 10^{1}$ (*Same item as* 11.9–91, *Met. Abs.*) *Subject Headings:* **1. Corpuscular radiation 2. Luminescen of the lunar surface 3. Crimean Astrophysical Observatory, U.S.S.R. I. Holden, F.** (*transl.*).—*A.*

12K–87 523.32:535.

Orlova, N. S., **Fotometricheskiĭ rel'ef lunnoĭ poverkhnosti.** [Photometric relief of the lun surface.] *Astronomicheskiĭ Zhurnal*, Moscow, 33(1):93–100, Jan./Feb. **1956.** 4 figs., 2 tabl 12 refs. Russian and English summaries p. 93. **DLC**—Relative measurements of the brightness the lunar surface carried out by B. A. Fedorets and the absolute measurements of the continen and the surface of the seas as similar in all points of the lunar disc, average coefficients of brightn (brightness factor, albedo) were deduced for various combinations of the angles of incidence a reflection. Results related only with the plane of incidence of the solar rays for seas and continen are given in tables. If the obtained results are represented in the form of a polar diagram of flectivity (diffusion function) then a group of curves is obtained, extremely extended in the directi to the Sun at any angle of incidence of solar rays. Curves for the seas are similar to those for t continents. The similarity of the character of curves shows that the unevenness of the lunar surfa is extreme and is the same for the seas and the continents. Values in the diffusion diagram of t Moon exceed considerably those of the terrestrial samples investigated. This shows that the surfa of the Moon is covered with extremely porous matter, resembling slags of a spongy structure. (*Sa item as* 12.1–125, *Met. Abs.*) *Subject Headings:* **1. Lunar photometry 2. Moon's surface.**—*Autho abstract.*

12K–88 523.3:

Sytinskaia, Nadezhda Nikolaeva, **Luna i ee nabliudenie.** [The Moon and its observatio Moscow, Gos. Izdat. Tekhniko-Teoreticheskoi Literatury, **1956.** 253 p. 70 figs., 10 tables, 64 e bibliog. p. 248–253. **DLC** (QB581.S9). Also her: **Priroda Luny.** [The nature of the Moo Moscow, Gos. Izdat. Tekhniko-Teoreticheskoi Literatury, **1959.** 175 p. 52 figs., 6 tables, 26 **DLC** (QB591.S9)—The primary portion of these two books is basically identical; it deals with Moon as a celestial object, lunar topography, physics of the Moon's surface, and lunar eclip Physical conditions on the Moon are discussed in sections on albedo, photometry, reflection polarization of light, color and luminescence, temperature, the problem of a lunar atmosphere composition of the Moon's surface. Some tabular and graphical material is included. In addi to this basic portion, the 1956 work has three chapters (omitted in the 1959 work) on pract aspects of lunar research, containing instructions for lunar observations with various methods. bibliography of over 130 items is also lacking in the later edition. *Subject Headings:* **1. M 2. Lunar bibliographies.**—*G.T.*

1957

12K–89 523.164.42:523.991.2:52

Elsmore, B. (*Cavendish Lab., Cambridge*), **Radio observations of the lunar atmosphere.** *I osophical Magazine*, London, 8th Ser., 2(20):1040–1046, Aug. **1957.** tables, 11 refs., eqs. **D** Also: article with same title in Paris Symposium on Radio Astronomy, July–Aug. 1958, [**Proc ings**], pub. Stanford Univ. Press, **1959.** p. 47–49. 6 refs. **DLC** (QB475.P26)—On Jan. 24 observations were made at a wavelength of 3.7 m of the lunar occultation of the Crab Nebula comparison of the time of obscuration of the nebula with the computed value enabled the refrac occurring in the lunar atmosphere to be estimated. An electron density at the Moon's surfa about 10^3 cm^{-3} was derived for cases of both an atmosphere in hydrostatic equilibrium and fo atmosphere which is continuously escaping; a figure which corresponds to a surface density o lunar atmosphere about 2×10^{-13} of that of the Earth's atmosphere at normal temperature pressure. *Subject Headings:* **1. Radio observation of lunar atmosphere 2. Lunar atmosp 3. Radio star occultation 4. Crab nebula.**—*Author's abstract.*

12K–90 523.36:550.385

*Gun-Bayer, Francis S., **The lunar magnetic field revealed by its projection on Earth.** *Revista niversitaria*, Santiago de Chile, 42(1):47–110, **1957.** 41 figs., numerous tables, foot-refs. **DWB**—asic ideas and arguments concerning the existence of a lunar magnetic field are reviewed, including re results of recent research. A lunar effect upon the Earth's magnetic field, reflected in a 29.5-day eriodicity of geomagnetic variations, appears to be established. Details are discussed. *Subject eadings:* **1. Lunar magnetic field 2. Lunar effects on geomagnetism 3. Geomagnetic variations.** *-N.N.*

12K–91 523.322

Sytinskaia, N. N., **Novoe znachenie svetovoĭ lunnoĭ postoiannoĭ.** [New value of the light nstant of the Moon.] *Astronomicheskiĭ Zhurnal*, Moscow, 34(6):899–902, Nov./Dec. **1957.** ble, 16 refs. Transl. into English in *Soviet Astronomy AJ*, New York, 1(6):870–873, Nov./Dec. 957. **DLC**—The light constant of the Moon is defined as the illumination E, by the light of the oon, of a plane at right angles to its rays at the phase angle 0° and the mean parallax of the Sun and oon. The measurements of the light of the Moon made in the U.S.S.R. with visual photometers uring 1932–1955 were used. Some of the results were calculated. BOUGUER's method was used r extrapolating to the edge of the Earth's atmosphere, and Rougier's curve for extrapolating to ase 0°. The derived mean value was $E = 0.342 \pm 0.011$ lux. This value, according to the method its determination, is reduced to the day spectral sensitivity curve of the eye. *Subject Heading:* **Brightness of Moon.**—*Author's abstract.*

1958

12K–92 523.35

Edwards, W. F. (*Calif. Inst. of Tech., Pasadena*) and Borst, L. B. (*Dept. of Physics, N. Y. Univ.*), **ossible sources of a lunar atmosphere.** *Science*, Wash., D. C., 127(3294):325–328, Feb. 14, **1958.** tables, 15 refs. **DLC**—Although the Moon is usually considered to have no atmosphere, recent bservations by the methods of radio astronomy are best explained by the assumption of a pressure 10^{-13} atmosphere. As in the case of the Earth, it is thought that the Moon lost volatile materials uring the period of formation, so that the only mechanisms of atmosphere production which can be lied upon are those which occur subsequent to the process of element formation or planet formation. UIPER suggests that molecules of weight less than 60 will be lost during the heat of the lunar day 35°C) since the lunar gravitational field is so low that gases in that range cannot be retained. The thor evaluates five sources of the heavy rare gases krypton and xenon, which are thought to be too avy to escape. *Subject Heading:* **1. Lunar atmosphere.**—*From authors' introduction.*

12K–93 523.164.34:523.32

Gibson, John E. (*Radio Astron. Branch, U. S. Naval Res. Lab., Wash., D. C.*), **Lunar thermal diation at 35 kmc.** *Institute of Radio Engineers, N. Y. Proceedings*, 46(1):280–286, Jan. **1958.** figs., 14 refs. **DLC**—Measurements of the thermal radiation of the moon were made at a frequency ar 35 kmc to investigate further the variation of the radio wave length brightness temperature th lunar phase first observed by PIDDINGTON and MINNETT (*see* 12K 69, this biblio.) at 24 kmc. mparison of the results with calculations by JAEGER (*see* 12K–78, this biblio.) suggests the lunar rface is composed of a layer of fine dust of very low thermal conductivity, the average depth of ich is estimated as one inch or more. *Subject Headings:* **1. Thermal radiation of Moon 2. Radar ission from Moon 3. Lunar dust layer 4. Lunar temperatures.**—*Author's abstract.*

12K–94 523.32

†Gilvarry, J. J. (*Research Lab. Allis-Chalmers, Milwaukee, Wisc.*), **The nature of the lunar maria.** *strophysical Journal*, Chicago, 127(3):751–762, May **1958.** 4 figs., 2 tables, 34 refs., 8 eqs. **DWB, -LC**—It is shown that the surface temperature of the Moon determined as a function of time by ETTIT and NICHOLSON from infrared measurements in the lunar eclipse of June 14, 1927, is consistent ly with a lunar surface composed of dust, in agreement with WESSELINK's conclusion from data PETTIT for the later eclipse of Oct. 27, 1939. The location of the observed area in the first eclipse rmits direct inference of a dust cover for the lunar highlands. For the second eclipse, it is pointed t that a significant fraction (approximately one-quarter) of the projected receiver area covered rtually the whole extent of Mare Vaporum. From solutions of the equation of heat conduction otained by others, the theoretical fall of temperature with time in the latter eclipse is calculated n the assumption that the surface of Mare Vaporum consists of bare rock but the surrounding ghlands are covered with dust. The predicted march of the temperature differs so greatly from ETTIT's determination that the presence of exposed lava on the surface is precluded, specifically for are Vaporum and by implication for any mare. The logical difficulties are discussed which this

result poses for theories identifying the surface of the maria with lava flows. It is shown that t best over-all fit to PETTIT's data for temperature versus time is obtained among suggested mod of the lunar surface by one corresponding to Gold's theory that the maria are craters filled w dust. For this theory, no inconsistencies are found with respect to lunar temperatures infer by infrared or microwave methods. *Subject Headings:* **1. Moon's surface 2. Lunar temperatur** —*Author's abstract.*

12K–95 523.

Platt, John R. (*Dept. of Physics, Univ. of Chicago*), **On the nature and color of the Moo surface.** *Science*, Wash., D. C., 127(3313):1502–1503, June 27, **1958.** 7 refs. **DLC**—So characteristic properties of the interstellar dust particles presumably deposited at the surface Mars and the Moon are discussed. The particles may not only well account for the reddening distant stars but may be responsible for the Moon's (and Mercury's) low 7% albedo and low therm conductivity even on elevated, hence supposedly dust free, locations. The first space man land on the Moon may encounter porous highly-reactive dust layers easily triggered into extens exothermic reactions. Current laboratory experimentation may yield valuable information several aspects related to lunar surface properties. *Subject Headings:* **1. Moon's surface 2. Lu dust layer.**—*W.N.*

12K–96 523.164

Salomonovich, A. E., **Radio emission of the moon at 8 millimeters.** *Soviet Astronomy AJ*, N York, 2(1):112–118, Jan./Feb. **1958.** 6 figs., 9 refs., 12 eqs. **DLC** (QB1.A4713). Transl. of origi Russian in *Astronomicheskii Zhurnal*, Moscow, 35(1):129–136, **1958. DLC**—The method a results of observations of thermal radio emission of the Moon in the 8 mm band are given. T observations were made with a two-meter radio telescope in 1955 and 1956. The dependence of mean temperature of lunar radiation on the phase of the moon was found to be approximated by expression $T_m = 197° - 32° \cos(\vartheta - 40°)$, where ϑ is the phase of the Moon, counting from new Mo The derived results are compared with data of already published observations. *Subject Headin* **1. Radio emission from Moon 2. Thermal radiation of Moon.**—*Author's abstract.*

12K–97 523.164

†Trexler, James H. (*Naval Res. Lab., Wash., D. C.*), **Lunar radio echoes.** *Institute of Ra Engineers, N. Y., Proceedings*, 46(1):286–292, Jan. **1958.** 13 figs., 21 refs. **DLC**—High-po radars at the Naval Research Laboratory have been used to study the reflecting properties of Earth's Moon. Experimental work over the last six years at frequencies in the 30 mc to 3000 band has revealed a lunar surface phenomenon which produces a "highlight." Measurements m at 198 mc have shown that more than 50% of the echo energy is reflected in the first 50 microseco after the leading edge of a short incident pulse contacts the Moon. This fortunate situation perm many interesting astronomical observations and suggests the use of wideband communicat signals in a circuit using the Moon as a passive relay. Many types of modulation have been succe fully passed over the lunar circuit, including amplitude modulation by voice. *Subject Head* **1. Radio echoes from Moon.**—*Author's abstract.*

12K–98 523.164

Yaplee, B. S.; Bruton, R. H.; Craig, K. J. and Roman, N. G. (*all, U. S. Naval Research L. Wash., D. C.*), **Radar echoes from the Moon at a wavelength of 10 cm.** *Institute of Radio Engine N. Y., Proceedings*, 46(1):293–297, Jan. **1958.** 8 figs., 15 refs. **DLC** (TK5700.I6)—Radar cont has been made with the Moon with short pulses at 2860 Mc, beginning a program of short-p lunar radar. The principal objective of the program is to obtain more accurate Moon-to-Ea distances than presently are known. Other information may result from the program, such as Earth's diameter, the interplanetary electron density, and the lunar surface characteristics. date, the program has yielded the following results: Earth-Moon distances have been measured c several days with consistencies of less than one-half mile; several rough reflectivity measureme have been made which indicate that the radar cross section of the Moon is 975 sq mi at 2860 with pulses of 2-μsec duration, and the fine structure of echoes may be correlated with lunar pography. (*Same item as* 11H–163, *Met. Abs.*) *Subject Heading:* **1. Radar echoes from Moo** *Authors' abstract.*

1959

12K–99 523.32:523.

Barabashov, N. P. and Koval', I. K., **Opyt fotograficheskoĭ poliarimetrii Luny so svetofil'tra** [Photographic polarimetry of the Moon with light filters.] *Akademiia Nauk SSSR. Komissiia Fizike Planet, Izvestiia*, No. 1:55–58, **1959.** 4 tables, 4 refs. **DLC**—The Moon was observed in

main focus of an 8″ Zeiss refractor through light filters and a polaroid placed in the ocular portion of the telescope. The filters had their maximum transmissivity at λ6470 and 4290. The polaroid was used in 3 positions at angles of 60° to each other. 36 negatives, obtained at phases of 74 and 82° were analyzed. 28 objects of the lunar surface were measured by means of an MF-2 microphotometer. The results are presented in the form of tables of values of degree of polarization calculated by V. G. FESENKOV's formula for each phase for red and blue filters. The change of degree of polarization along a ray of Tycho crater are also investigated. For most of the objects studied the degree of polarization has larger values in blue than in red light, but for some (7 out of 28) the reverse is the case. Along the ray of Tycho crater the highest degree of polarization is observed in blue light; outside the crater the degree of polarization becomes about equal for both spectral regions. *Subject Headings:* **1. Polarization of light from Moon 2. Lunar photometry 3. Lunar craters.**—*Ref. Zhur. Astronomiia*, 1A434, 1961. Ⓢ

12K–100 523.322:523.4:535.24

Barabashov, N. P.; Ezerskaia, V. A.; Ezerskiĭ, V. I. and Ishutina, T. I., **K voprosu o fotometricheskoĭ odnorodnosti lunnoĭ poverkhnosti.** [Photometric homogeneity of the Moon's surface.] *Akademiia Nauk SSSR. Komissiia po Fizike Planet, Izvestiia*, No. 1:67–79, **1959.** 6 figs., 7 tables, 9 refs., 2 eqs. **DLC**—A formula is derived for comparing photometric characteristics of lunar objects on the basis of their brightness at various phase angles and at full Moon. Data on 168 lunar objects, taken from the catalog of V. A. FEDORETS, and special photometric measurements along 6 sections of the full Moon were analyzed. All results indicate that the lunar surface is photometrically homogeneous and consequently has uniform texture throughout. *Subject Headings:* **1. Moon's surface 2. Brightness of Moon 3. Lunar photometry.**—*G.T.* Ⓢ

12K–101 523.32:523.035.313

Barabashov, N. P.; Ezerskiĭ, V. I. and Fedorets, V. A. (*all, Kharkov Astron. Obs.*), **Color contrasts of the lunar surface.** *Soviet Astronomy AJ*, New York, 3(3):484–489, Dec. **1959.** 8 figs., 4 tables, 10 refs. **DLC.** Transl. of **O tsvetovykh kontrastakh lunnoĭ poverkhnosti.** *Astronomicheskiĭ Zhurnal*, Moscow, 36(3):496–502, May/June **1959. DLC**—The photographic spectrophotometric method has been employed for investigating the spectral reflecting properties of details of the lunar surface. The color contrasts in the usual system of color indexes are 0^m2–0^m3. In the majority of cases, the relation between ΔCI and $\Delta \log I_{550}$ is close to linear, $(\Delta CI/\Delta \log I_{550})$ being ≈ 0.6. (*Same item at* 11L–129, *Met. Abs.*) *Subject Headings:* **1. Moon's surface 2. Color of Moon 3. Albedo of Moon.**—*Authors' abstract.*

12K–102 523.164.34

Evans, J. V.; Evans, S. and Thomson, J. H. (*all, Jodrell Bank Experimental Station, Manchester Univ., Eng.*), **The rapid fading of Moon echoes at 100 Mc/s.** (In: Paris Symposium on Radio Astronomy, July-Aug. 1958, [**Proceedings**], pub. Stanford Univ. Press, **1959.** p. 8–12. 4 figs., 9 refs., eqs.) **DLC** (Qb475.P26)—This extensively illustrated paper reports the results of experiments carried out at Jodrell Bank concerning the rapid fading of Moon echoes at 100 Mc/s. The results indicate that the rapid fading is due to the Moon's libration. The principal component of the Moon's libration is the diurnal libration caused by the observer's motion due to the rotation of the Earth. This changes the distances of the scattering centers relative to the observer, thereby altering the phase of the signal returned from each center and consequently the amplitude of the combined signals. *Subject Headings:* **1. Radio echoes from Moon 2. Jodrell Bank, Eng.**—*I.S.* Ⓢ

12K–103 523.346

Fielder, Gilbert, **Measured profiles of the Moon's surface, and the estimates of magnitudes of the errors in relative altitude (Studies in lunar topography, Pt. 4).** Manchester. Univ. Dept. of Astronomy, Contract AF 61(052)-168, Technical Scientific Note, No. 4, Nov. **1959.** 49 p. 16 figs., 9 tables, 2 refs., 14 eqs.—Systematic errors involved in measuring lunar altitudes are evaluated and formulae are given for evaluating these and random errors. Lists of altitudes and land profiles are given for three lunar regions (Caucasus, Hyginus and Ptolemaeus). *Subject Headings:* **1. Moon's surface 2. Lunar topography.**—*Author's abstract.* Ⓢ

12K–104 523.3

†Firsoff, Valdemar Axel, **Strange world of the Moon: an enquiry into lunar physics.** London, Hutchinson, **1959.** 226 p. figs., photos, bibliog. at end of each ch. **DLC** (QB581.F46 1959). Review by B. E. J. Pagel in *Nature*, London, 185(4715):718, March 12, 1960.—Discusses and interprets characteristics and changes seen by the author and other lunar observers in terms of known physical and chemical laws. Suggests that the Moon is a captured planet, that planetary perturbations and tidal action led to mountain building and fault systems in both Earth and Moon. Favors

Lunavoc hypothesis (J. E. Spurr) and attributes ray system to erosion by running water an maria filled by impure ice. A subsurface hydrosphere, seasonal changes, and a rudimentary lif form are postulated. In addition to lunar photographs, sketches made from lunar observation and a lunar tectonic grid are included. Physical, chemical, and mathematical details in appendix *Subject Headings:* **1. Moon 2. Moon's surface 3. Lunar environment.**—*E.Z.S.* Ⓢ

12K–105 523.34:523.16

Firsoff, V. A., **Is the moon covered with dust.** *British Astronomical Association, Journa* 69(4):153–155, May **1959.** 6 refs. **DWB**—The author offers criticism of Gold's hypothesis that th Moon is covered with compacted dust. Although there should be some dust on the Moon the autho points out the difficulties attendant on Gold's hypothesis. These difficulties include: fine dust is good light reflector—the Moon's albedo is 0.07; the atmospheric pressure on the Moon is almost n relative to the Earth's; Moon's gravity is 1/6 g; and sub-aerial lunar denudation must always hav been negligible compared to terrestrial conditions. The author points out that laboratory studi have not been corrected with these factors in mind, and Gold's hypothesis thus adds little informatio on the nature of the lunar surface. (*Same item as* 11.9–97, *Met. Abs.*) *Subject Headings:* **1. Moon surface 2. Lunar dust layer.**—*A.J.M.*

12K–106 523

Frederick, Robert, **La lune, notre satellite naturel.** [The Moon, our natural satellite.] *Co naissance du Monde*, Paris, No. 13:50–55, Dec. **1959.** 5 figs. **DLC**—A semi-popular discussion the Moon is presented. It deals with the Moon's dimensions, its orbit, phases, eclipses, relie probable traces of some kind of water, hypotheses of the Moon's origin, and the probable existen of a magnetic field. Synodical and sidereal revolution, measurement of lunar altitudes, hypothes on cracks in the lunar crust and on the origin of the lunar craters are illustrated. *Subject Headin* **1. Moon.**—*O.T.* Ⓢ

12K–107 523.3

Fremlin, J. H. (*Dept. Physics, Univ. Birmingham*), **Volcanoes on the Moon.** *Nature*, Londo 183(4656):239, Jan. 24, **1959.** [**Comment by**] **J. C. Jaeger and** [**Reply by**] Fremlin. *Ibi* 183(4671):1316–1318, May 9, **1959. DLC**—The article discusses why the origin of the Moo craters could be attributed to volcanic activity rather than meteoric action. The effects of therm conductivity of dust and the fact that the temperature of the hot rock in the Moon has reached equilibrium temperature point some time ago are discussed. The high temperature release of gas on the Moon is caused by the low mechanical pressure of the dust. This encourages frequent sm local instabilities that result in periodic liberation of puffs of hot gas and dust. (*Same item* 11.9–94, *Met. Abs.*) *Subject Headings:* **1. Lunar craters 2. Lunar atmosphere.**—*N.N.*

12K–108 523.346:523.1

Gold, Thomas (*Prof. of Astronomy, Harvard College Obs.*), **Dust on the moon.** *U. S. Air For Office of Scientific Research, Vistas in Astronautics: second annual Symposium, April* 1958, pu N. Y., Pergamon Press, **1959.** p. 261–266. 2 figs., 5 refs. **DWB** (629.1388 U581as)—Craters the Moon are said to be due to explosions produced by high velocity meteor impact rather th volcanic activity as was previously believed. Evidence against the lava flow theory of "maria" presented. Time sequences can be established in areas of overlap of crater rims and from eviden of erosion of rims. Dust migration accounts for level crater bottoms. No evidence of crus distortions exists, leading one to suspect that no volcanism was going on during the period wh the craters were being formed. Radar spectra indicate very smooth surfaces (as snow on ear down to very fine grain and thus no great volcanic or stony structure. (*Same item as* 11.5–1 *Met. Abs.*) *Subject Headings:* **1. Moon's surface 2. Lunar dust layer 3. Lunar craters.**—*M.R.*

12K–109 523.35:523.164

Hédervári, Péter, **A hold légköréről.** [On the Moon's atmosphere.] *Időjárás*, Budape 63(1):55–57, Jan./Feb. **1959. DLC**—Present knowledge on the Moon's atmosphere is review The current figure accepted for the Moon's atmospheric density is 5.10^{-13} times the terrest atmospheric density. This figure was obtained by Elsmore at Cavendish Laboratory by means radio astronomical measurement. The Moon's atmosphere is believed to be composed of SO_2, O_3 a possibly rare gases. Volcanic eruptions are one of its possible sources. During the lunar ni some of the atmosphere possibly is deposited at the Moon's surface. The total mass of the lu atmosphere is less than one millionth of the mass of the Moon, a ratio similar to that of the Eart mass to that of its atmosphere. (*Same item as* 11.9–98, *Met. Abs.*) *Subject Heading:* **1. Lu atmosphere.**—*G.T.*

12K–110 523.164.83

Hey, J. S. and Hughes, V. A. (*both, Royal Radar Establishment, Malvern, Eng.*), **Radar observations of the Moon at 10-cm wave length.** (In: Paris Symposium on Radio Astronomy, July–Aug. 1958, [**Proceedings**], pub. Stanford Univ. Press, **1959.** p. 13–18. 8 figs., 3 refs.) **DLC** (QB475.P26)—A description of some of the preliminary results reached from observations of radar echoes from the Moon obtained at 10-cm wave lengths at the Royal Radar Establishment, Malvern. Observations were made on two types of display. On one the signal was displayed as a deflection of a time base on a cathode-ray tube, and on the other as a brightness-modulation of the trace. *Subject Headings:* **1. Radar echoes from Moon 2. Malvern, Eng.**—*I.S.* Ⓢ

12K–111 523.32:523.346

Kokhan, E. K., **Issledovanie v trekh uchastkakh spektra stepeni i ugla polozheniia ploskosti poliarizatsii sveta, otrazhennogo lunnymi detaliami.** [Investigation in three spectral regions of the degree of polarization and the position of the plane of polarization of light reflected by lunar details.] *Akademiia Nauk SSSR. Komissiia po Fizike Planet, Izvestiia*, No. 1:41–53, **1959.** 18 figs., table, 17 refs., 4 eqs. **DLC**—Methods and results of electro-polarimetric measurements of the Moon in integral light and through yellow and blue filters (Pulkovo and Abastumani, 1955–1958) are reported. 34 objects, including maria, craters, bays, etc., were measured. Curves showing variations of degree of polarization as a function of phase angle, dependence of maximum positive polarization on maximum brightness of the object, and dependence of the plane of polarization on phase angle are presented. *Subject Headings:* **1. Lunar topography 2. Polarization of light from Moon.**—*Based on Ref. Zhur. Astronomiia, 2A488, 1961.* Ⓢ

12K–112 523.34

Kopal, Zdeněk and Fielder, Gilbert, **Determination of the heights of mountains on the Moon.** Manchester Univ. Dept. of Astronomy, Contract AF 61(052)-168 (Studies in lunar topography), Technical Scientific Note, No. 1, March **1959.** 33 p. 2 figs., 19 refs., 37 eqs.—Following a brief introduction, in which the previous work on the determination of the heights of lunar mountains is summarized and its limitations pointed out, the second part of this paper contains an exhaustive discussion of the geometrical aspects of the problem of determination of the altitudes of lunar elevations by a triangulation of the shadows cast on the surrounding landscape during sunrise or sunset; and formulas are deduced relating explicitly the desired heights with the observed shadows to the requisite degree of accuracy. The second part of the present paper also contains a description of the procedure actually followed in securing the cinematographic data, essential for this purpose, at the Observatoire du Pic-du-Midi, and their subsequent microphotometric measurements at Manchester. *Subject Heading:* **1. Lunar topography.**—*Authors' abstract.* Ⓢ

12K–113 523.36

Kopal, Zdeněk (*Head, Dept. of Astron., U. of Manchester*), **Does the Moon possess a magnetic field?** *Space Journal*, Nashville, Tenn., 2(1):3–8, Sept. **1959.** 6 figs.—Direct information on lunar magnetism is still lacking. However, several recent astronomical investigations carried out in terrestrial observatories have thrown considerable light on the question of a possible lunar magnetic field, and in fact, may have gone a long way toward answering it—in the negative. The method employed was based on studies of lunar luminescence. The present article first explains lunar luminescence, and then presents several arguments based on it which negate the possibility of a magnetic field on the Moon. Several photographs nicely illustrate various probes and the lunar surface. (*Same item as* 11.7–120, *Met. Abs.*) *Subject Headings:* **1. Brightness of Moon 2. Lunar magnetic field.**—*I.S.*

12K–114 523.346

Kozyrev, Nikolaĭ A. (*Crimean Astrophysical Obs.*), **Observation of a volcanic process on the Moon.** *Sky and Telescope*, N. Y., 18(4):184–186, Feb. **1959.** photos. **DWB, DLC.** Also his **Vulkanicheskaia deiatel'nost' na Lune.** [Volcanic activity on the Moon.] *Priroda*, Moscow, 3:84–87, March **1959.** 2 figs. **DLC**—Evidence that some kind of eruption occurred on the central peak of Alphonsus on Nov. 3, 1958 is contained in two spectrograms taken early that morning. Copies of the spectrograms and their analysis are shown. The author observed this phenomenon through his telescope as it occurred. Explanations on how the spectrograms were taken and information on the interpretation of the spectrum bands are given. The existence of the C_2 molecule in the effusing gases is considered established. *Subject Headings:* **1. Lunar volcanic processes 2. Volcanic eruptions on Moon.**—*E.Z.S.* Ⓢ

12K–115 523.34

†Krejci-Graf, Karl (*Geologisch-Paläontologisches Inst., Univ. Frankfurt a.M.*), **Der Bau der Mondoberfläche im Vergleich mit der Erde: Daten und Deutung.** [Structure of the Moon's surface

as compared with Earth: data and interpretation.] *Astronautica Acta*, Vienna, 5(3/4):163–22
1959. 8 figs., map, 7 tables, 52 refs. German, English and French summaries p. 163–164. **DWB**
Interpretation of lunar morphology is hampered by our ignorance of other than superficial phenome
of our own planet. In interpretation, the mechanics of experiments in different scales should
considered: physical properties of materials have to be changed in correlation with the scale. M
chanical similarity is lost if the scale is changed. The maria are probably lava sheets comparal
to the large basaltic plateaus of Earth. The (brighter) terrae continue below the (darker) mar
as is evident from "drowned" structures in marginal regions. Maria are lower than neighbori
terrae, but are undulating territories, frequently higher in their central parts, or tilted rather th
horizontal. The mean height of the maria equals the mean height of the terrae. Maria wou
become terrae if covered by craters, as is shown by the bright color of isolated craters and th
surroundings. The distribution of heights of the Moon's surface follows an asymmetric curve w
one maximum, while the corresponding curve of the Earth has two well developed maxima; t
hypselographic summation curve is concave for the Earth but convex for the Moon; the featu
of Earth are due to erosion of heights and sedimentation in deeps, with the regions about sea le
as main bases for erosion and first levels of deposition; while the Moon has no equivalent to th
processes. Moon craters are interpreted as volcanic forms. The meteor-hypothesis is unable
explain linear arrangements, filling to the brim of craters (*Wargentin*), and circular shapes; n
teorites should strike obliquely. Stripes are interpreted as volcanic ashes. Lunar volcanism see
to be characterized as monophasic, its forms therefore comparable to certain terrestrial volcano
Differences of albedo of terrae and maria may be due to different rocks, different (rough or smoo
surface forms, or different consistency (solid or dust). Powders are brighter than the rocks fr
which they originate, brightest if smooth. Degree and angles of polarization point to vitre
nature of the maria, and partial dust covering of terrae, while the stripes seem to be formed by du
Observations of polarization data refer to large areas and are, therefore, not referable to spec
rocks; such data are averages, the coincidence of which with the data of specific terrestrial ro
or minerals have no diagnostic value. Of useful minerals, the presence of hydrates and carbona
as well as of other exhalation products seems to be, to some degree, probable. *Subject Headin*
1. Moon's surface 2. Lunar topography.—*Author's abstract.*

12K–116 52

Kuiper, Gerard P. (*Yerkes & McDonald Obs., Williams Bay, Wisconsin*), **The Moon.** *Jou*
of Geophysical Research, Wash., D. C., 64(11):1713–1719, Nov. **1959.** 5 refs. **DLC.** Also iss
in Symposium on Space Physics, Wash., D. C., April 1959, **Exploration of space.** Pub. N.
Macmillan, **1960.** p. 70–76. **DWB**—In the first part of this paper a brief listing of various ty
of information on the Moon is given. Then the evolution of the Moon is discussed in view of
author's theory, assuming that the accreted mass of the Moon heated up and melted, later froze
cooled. The heating process lead 1) to the escape of large quantities of steam or other gases, 2
explosions as gases escaped, and 3) to the appearance of lavas. In the second part of the article
author interprets some of the features visible on the lunar surface in connection with his the
Subject Headings: **1. Moon's surface 2. History of the Moon.**—*E.K.* Ⓢ

12K–117 523

Liubanskiĭ, K. A., **Popytka opredeleniia absoliutnogo vozrasta lunnykh formatsiĭ.** [Atte
at determining the absolute age of lunar formations.] *Vsesoiuznoe Astronomo-Geodezicha*
Obshchestvo, Biulleten', No. 25(32):3–8, **1959.** 4 tables, 4 refs. **DLC**—The morphological anal
of the Moon's surface indicates that in spite of the large number of lunar craters of volcanic o
many others are formed due to falling meteorites. A study of the character and relative dimens
of the last mentioned type of craters leads to development of four hypotheses with mathema
formulation of probable angle of incidence and velocity of meteorites. A special study of diame
and number of the meteoritic craters, formed on the soft lava of the volcanic seas (Mare Humo
and Mare Tranquilitatis), was made from old data of the English astronomic catalogues.
result of this study the probable age of the craters is statistically analyzed in relation to met
activity. The obtained values of ages are not considered to be final and further study is re
mended. *Subject Headings:* **1. Lunar craters 2. Age of lunar features.**—*N.P.S.* Ⓢ

12K–118 523.32:523.1

†Mezger, P. G. and Strassl, H. (*both, Dept. of Radioastron., Bonn Univ., Observ.*), **The the**
radiation of the Moon at 1420 Mc/s. *Planetary and Space Science*, N. Y., 1(3):213–226, Aug.
4 figs., 2 tables, 20 refs., 17 eqs. **DWB**—Measurements of the thermal radiation of the mo
1420 Mc/s have been made with the continuum receiver of the 25 m radio telescope of Bonn Un
sity. The measurements cover about 3 lunations (30 April to 22 July 1958). The observa
and their reduction are described in detail. It is found that—within the working accuracy of
±2 per cent relatively—the radiation temperature of the Moon at 1420 Mc/s shows no vari

with the phase of the Moon. This may be explained by the fact that the observed radiation has its origin at some depth underneath the Moon's surface where the periodic variations of heating from the sun have become insignificant. The mean value of the radiation temperature at 1420 Mc/s is found to be 250.2° with an estimated absolute uncertainty of about ±12 per cent. (*Same item as* 11.9–93, *Met. Abs.*) *Subject Headings:* **1. Thermal radiation of Moon 2. Lunar temperatures 3. Radio emission from Moon.**—*Authors' abstract.*

12K–119 523.34:778.3

Rackham, Thomas, **A systematic microdensitometric technique and its application to formations in the Mare Imbrium (Studies in lunar topography, Pt. 5).** Manchester. Univ. Dept. of Astronomy, Contract AF 61(052)-168, Technical Scientific Note, No. 5, Nov. **1959.** 41 p. 5 figs., photo, 8 tables, 7 refs.—This contribution describes a systematic microdensitometric measuring technique and its application to lunar cine negatives of the western Mare Imbrium. Computed relative heights are tabulated and profiles are drawn for Aristillus, Archimedes C, Piton and Autolycus. *Subject Heading:* **1. Lunar topography.**—*Author's abstract.* Ⓢ

12K–120 523.346:523.51

Sabaneev, P. F., **Rezul'taty modelirovaniia lunnykh tsirkov na sfericheskoĭ poverkhnosti.** [Results obtained with models of lunar cirques on a spherical surface.] *Vsesoiuznoe Astronomo-Geodezicheskoe Obshchestvo, Biulleten'*, No. 24(31):53–56, **1959.** 5 figs., ref. **DLC**—A thin (1 mm) layer of cement is placed on a spherical surface and a 6 g cement ball is thrown into it from the height of 1.5 m. As a result a circular bank is formed, similar to the shape of lunar cirques, as illustrated by three photographs. The lunar mountain ridges around the seas and numerous craters appear to have been formed by a similar process. *Subject Headings:* **1. Lunar craters 2. Meteorite craters 3. Model experiments.**—*N.P.S.* Ⓢ

12K–121 523.37:535.243

†Sergeeva, A. N., **Spektrofotometriia lunnykh obrazovanii.** [Spectrophotometry of lunar formations.] *Akademiia Nauk SSSR. Komissiia po Fizike Planet, Izvestiia*, No. 1:59–66, **1959.** 3 figs., 3 tables, 9 refs. **DLC**—Thirty-eight spectrograms of various lunar objects, obtained at the Astronomical Observatory of Kiev Univ., were analyzed as to spectral intensity distribution. The instruments and methods of observation and analysis are described in detail. Results concerning 23 lunar objects are tabulated and discussed comparatively. It is found that in most cases color contrasts between the various lunar objects do not appear; sometimes they amount to 10–15%, in rare cases they reach 20%. Craters and mountain formations usually have a reddish tint compared with the maria. The latter are bluish-green, with the exception of two which appeared reddish. A quantitative comparison with results of N. P. Barabashov and A. T. Chekida shows good agreement. *Subject Headings:* **1. Color of Moon 2. Moon's surface 3. Spectrophotometry of Moon 4. Lunar photometry.**—*Based on Ref. Zhur. Astronomiia*, 1*A*436, 1961. Ⓢ

12K–122 523.323.6

Sharonov, V. V., **Novyĭ sposob otsenki iarkosti lunnykh zatmeniĭ po vidimosti detaleĭ lunnogo diska.** [New method of estimating the brightness of lunar eclipses from the visibility of details on the lunar disk.] *Vsesoiuznoe Astronomo-Geodezicheskoe Obshchestvo, Biulleten'*, No. 24(31):18–23, **1959.** table, 11 refs. **DLC**—The well known visual scale of brightness for qualitative evaluation of lunar eclipses, developed by A. Danjon and others, is reviewed with the author's comments. A number of contradictions in evaluation of the same eclipses are recorded by different observers at different places in view of the psycho-physiological factors affecting individual judgement of the brightness degree and different conditions during observations. Future photometric services for evaluation of lunar eclipses will undoubtedly substitute the visual rating. However, photometric observation, at the present time, is not always feasible due to geographic and weather conditions affecting visibility. Therefore, the Astronomic Council of the Academy of Sciences of the U.S.S.R. has suggested characterizing the brightness on the basis of contrast, clearness and brightness of visible lunar details and background. The character of observations is also affected by the eclipse phase (at beginning of the phase, totality and the end of phase). Brightness value characterized by visible details of: dark edge, reddish coloring, clearly visible seas, shades, separate craters, orange coloring of bright edge, etc. are given in numerical scales and discussed in the text. *Subject Headings:* **1. Lunar eclipses 2. Brightness of Moon.**—*N.P.S.* Ⓢ

12K–123 523.34

Sytinskaia, N. N., **Veroiatnye razmery nerovnosteĭ mikrorelefa lunnoĭ poverkhnosti.** [Probable dimensions of irregularities in the microrelief of the Moon's surface.] *Akademiia Nauk SSSR. Komis-*

siia po Fizike Planet, Izvestiia, No. 1:81–84, **1959.** 2 tables, 8 refs., 2 eqs. **DLC**—Linear dimen of irregularities of the microrelief of the lunar surface are evaluated by comparing the laws of refl for various spectral regions. The law of reflection is represented by the smoothness factor, i.e parameter q according to the empirical formula $B = B_0 \cos q_i$, expressing the brightness var along the radius of the disk at full moon (i = angle of incidence of the Sun's rays). The use o photometric data confirms that $q = 0$ for the visual portion of the spectrum (this indicates s roughness of the surface), while according to radar observations at λ1.7 m, values of q of the of 30 are obtained which corresponds to specular reflection. This latter fact indicates tha gularities of the microrelief must be considerably smaller than 1 m and probably have sizes order of 0.1 mm to 10 cm. *Subject Heading:* **1. Moon's surface.**—*Ref. Zhur. Astronomiia*, 2 1961. Ⓢ

12K–124 523.34:

Sytinskaia, N. N. (*Astron. Obs. Acad. Sci., U.S.S.R.*), **New data on the meteoric-slag t of the formation of the outer layer of the lunar surface.** *Soviet Astronomy AJ*, New York, 3(2) 314, March/April **1959.** table, 18 refs. **DLC.** Transl. of **Noyye materialy po meteorno-shla teorii obrazovaniia naruzhnogo pokrova lunnoĭ poverkhnosti.** *Astronomicheskiĭ Zhurnal*, M 36(2):315–321, March/April **1959. DLC**—The results of photometric, colorimetric and polari investigations of the Moon, as well as data on the thermal conductivity of the outer layer, ha the author to the conclusion that everywhere the visible lunar surface is composed of highly p ragged material, the structure of which resembles volcanic slag. It originated from the rocks lunar crust under the influence of explosions, accompanying the collisions of meteors with the surface. New facts are given which confirm this "meteoric-slag" theory of the origin of the layer of the lunar surface. Recent determinations give such low values for the possible density lunar atmosphere, that even micrometeorites should reach the lunar surface with cosmic velo Rocket investigations give a frequency of encounters with micrometeorites equal to one impa cm^2 per minute. Therefore, the action of micrometeorites alone is sufficient for the formation lunar surface of a continuous film of modified material during a very short time. The resultin material is of a dark color due to the decomposition of silicates of the type of olivine and the for of black iron oxides of the type FeO, Fe_2O_3 and Fe_3O_4. It is darker on the lunar maria than "continents" because the original rocks of the former contain a higher proportion of iron. (*Same item as* 11L–135, *Met. Abs.*) *Subject Headings:* **1. Moon's surface 2. Micrometeorites.**—*Au abstract.*

12K–125 535.24:

Teifel', V. G. (*Acad. Sci., Kazakh S.S.R.*), **On normal color indexes and the color-brig relation for portions of the lunar surface.** *Soviet Astronomy AJ*, New York, 3(1):115–121, Jan **1959.** 8 figs., 3 tables, 8 refs. **DLC.** Transl. of **O normal'nykh pokazateliakh tsveta i zavis tsvet-iarkost' uchastkov lunnoĭ poverkhnosti.** *Astronomicheskiĭ Zhurnal*, Moscow, 36(1):11 Jan./Feb. **1959. DLC**—A catalog of normal color indexes of 262 small portions of the lunar s was compiled from photometric measurements of spectrograms of lunar regions in two wavele On the basis of the catalog data, the upper limit of color contrasts on the lunar surface in a s of normal color indexes may be judged. The color indexes lie in the limits of $+0^m76$ to $+0$ the color index of the reference star α Aurigae is taken to equal $+0^m82$. The mean color in all lunar objects investigated equals $+0^m85$. The existence is confirmed of a relation betwe color and brightness of details on the lunar surface, which is expressed in the first approxima a linear relation. (*Same item as* 11L–131, *Met. Abstr.*) *Subject Headings:* **1. Photometric obse techniques 2. Color of moon 3. Moon's surface 4. Lunar photometry.**—*Author's abstract.*

12K–126

Teifel', V. G. (*Acad. Sci., Kaz. S.S.R.*), **The difference in the spectral properties of areas lunar surface.** *Soviet Astronomy AJ*, New York, 3(6):955–959, May/June **1960.** 2 tables. Transl. of **O razlichiiakh spektral'nykh svoistv uchastkov lunnoĭ poverkhnosti.** *Astronom Zhurnal*, Moscow, 36(6):1041–1046, Nov./Dec. **1959. DLC**—The results of the spectrophot measurement of 90 lunar areas in the interval λλ390–620 mμ are considered. The spectral for these areas, constructed relative to a reference area in Mare Vaporum, are characterized almost monotonic variation of intensity along the spectrum, and this allows the color indice used for the determination of the color of lunar objects. The maximum difference in the s curves, expressed in relative spectrophotometric gradients, is 0.57 for λλ390–500 mμ and 0 λλ510–620 mμ, i.e., it does not exceed 0.6 of the spectral class dG. (*Same item as* 11.12–17 *Abs.*) *Subject Headings:* **1. Moon's surface 2. Spectrophotometric observations of Moon.**—*A abstract.*

12K–127 523.346:778.3

Turner, Geoffrey, **Errors involved in the photographic determination of heights and a preliminary study of the region of Ptolemaeus and Alphonsus.** Manchester. Univ. Dept. of Astronomy, Contract AF 61(052):168, (Studies in lunar topography), Technical Scientific Note, No. 3, June **1959.** 17 p. 6 figs., 3 photos, 2 tables, 10 refs., some eqs.—A brief recapitulation of the cine photographic method is given and the errors arising from photographic and seeing effects together with the measuring technique are discussed. The limitations, imposed by our present inadequate knowledge of basic selenographic coordinates are described and the need for further positional measures stressed. Heights are given for the eastern ramparts of the crater Ptolemaeus and the eastern ramparts and central mountain of the crater Alphonsus. *Subject Headings:* **1. Lunar photographs 2. Lunar topography.**—*Author's abstract.* Ⓢ

12K–128 523.346

Turner, Geoffrey, **Measured heights of mountains in the South Eastern part of Mare Tranquilitatis.** Manchester, Univ. Dept. of Astronomy, Contract AF 61(052)-168, (Studies in lunar topography), Technical Scientific Note No. 6, Nov. **1959.** 23 p. 2 figs., photo, 4 tables, 7 refs.—Heights and slopes are given for features in the area of Mare Tranquilitatis with constructed panoramic skylines for chosen points in the region. The results are compared with earlier work. *Subject Headings:* **1. Moon's surface 2. Lunar topography.**—*Author's abstract.* Ⓢ

12K–129 523.346

*Turner, Geoffrey, **Measurements of the height of the walls of the crater Archimedes.** Manchester. Univ. Dept. of Astronomy, Contract AF 61(052)-168, (Studies in lunar topography), Technical Scientific Note, No. 7, Dec. **1959.** 21 p. 3 figs., 2 photos, 17 tables, 6 refs.—Measured heights of the walls of Archimedes are given, together with the slopes and profiles of the walls. *Subject Headings:* **1. Lunar topography 2. Lunar craters.**—*Author's abstract.* Ⓢ

12K–130 523.34:523.161

Whipple, Fred L. (*Dir., Smithsonian Astrophys. Obs., Prof. of Astronomy, Harvard College Observatory*), **On the lunar dust layer.** *U. S. Air Force. Office of Scientific Research, Vistas in Astronautics; second annual Symposium, April* 1958. pub. N. Y. Pergamon Press, **1959.** p. 267–72. 18 refs. **DWB** (629.1388 U581as)—Observations of the Moon made optically in the infrared by radio and by radar indicate that the Moon's surface consists of a thin insulating layer overlying denser materials, producing a surface that is a very poor reflector at all frequencies so far observed. At dimensions comparable to the wave length of light, the surface is almost completely rough, but it is relatively smooth at wave lengths and dimensions comparable to 10 cm. The Moon's surface is subject to bombardment by meteoritic material and corpuscular radiation (protons) and to a slow rain of dust, molecules, atoms, and ions, as a consequence of the meteoritic bombardment and sputtering. The writer concludes that these processes coupled with solar radiation will tend to cement the dust into a weak, porous matrix and that no appreciable quantity of loose dust will be found on the Moon's surface. The surface material should not blow badly in a rocket jet and should be sufficiently rigid for support of the normal structures and operations required of a lunar expedition. (*Same item as* 11.4–100, *Met. Abs.*) *Subject Headings:* **1. Lunar dust layer 2. Moon's surface.**—*Author's abstract.*

1960

12K–131 523.39

Akademiia Nauk SSSR, **Atlas obratnoĭ storony Luny.** [Atlas of the far side of the moon.] Moscow, AN SSSR, **1960.** 149 p. 3 figs., 3 tables, 30 photos, 5 refs. **DLC** (QB595.A46). Transl. by Leon Ter-Oganian, issued New York, Pergamon Press, **1961.** 141 p. illus. included. Price: $7.00. Also transl. by Liaison Office, Technical Information Center, Wright-Patterson Air Force Base, Ohio, **1960.** 157 p. illus. **DWB.** Review in *American Rocket Society, Journal,* 31(7):1034, July **1961.** Also: review by Alexander A. Mikhailov (*Pulkovo Observatory, USSR*), in *Astronautics,* New York. 6(3):40–41, March **1961.** fig. **DLC**—On Oct. 7, 1959, photographs of the far side of the Moon were taken from an automatic interplanetary station and transmitted to the Earth. The pictures were analyzed jointly by the State Astronomical Institute and the Central Research Institute of Geodesy, Cartography and Aerial Photography at Moscow, and independently, at the astronomical observatories of Pulkovo and Kharkov. In this volume results of the analyses are reported. After description of the methods used in obtaining the photographs, improving their quality of resolution and photometrically analyzing them, a map of the far side of the Moon with all the identified objects is presented; 498 dark or light objects are listed and described; finally, the original photographs are reproduced. The review by MIKHAILOV includes a full-page reproduction of the map. *Subject Headings:* **1. Far side of Moon 2. Lunar maps 3. Lunar photographs. I. Barabashov, N. P.** (*ed.*) **II. Mikhailov, A. A. III. Lipskiĭ, Iu. N.** (*ed.*).—*G.T.* Ⓢ

12K–132 523

Alexandrov, Igor (*Aeronutronics Div., Ford Motor Co., Newport Beach, Calif., and Dept. Physics, U. C. L. A.*), **The lunar gravitational potential.** *Advances in the Astronautical Scienc* New York. Vol. 5, 1959, issued **1960.** p. 320–324. 5 refs., 19 eqs. **DWB** (629.1388 A512pr **DLC** (QB1.A26)—Deviations from sphericity of the moon are revealed by both photograp measurements of the disk and observations of the physical librations. By employing the best these data, and assuming the shape of the moon to be a triaxial ellipsoid, the ratios of the mome of inertia are obtained from physical libration data, whereas two of the three axes of the ellips are determined from photographic measurements of the disk. These data yield the length of third axis. The semimajor axes of this triaxial ellipsoid are 1738.57 ±0.07 km, 1738.21 ±0.07 k and 1737.49 ±0.07 km. The lunar potential in a lunicentric system is then calculated assuming further that the density distribution is given by a compressional model. (*Same item* 11.12–177, *Met. Abs.*) *Subject Headings:* **1. Moon's oblateness 2. Lunar gravitation.**—*Auth abstract.*

12K–133 523

Alter, Dinsmore (*Griffith Obs.*), **The Alphonsus story.** *Lunar and Planetary Exploration C loquium, Proceedings,* 1(4):19–22, Jan. 12, **1959** (re-issued in bound vol., 1960). 2 figs. **DV DLC**—On Oct. 26, 1956 the author obtained photographs of the Moon showing a haze in Alphon apparently due to a slight discharge of gas from the tiny, very black spots along its rills, each of spots containing a craterlet. N. A. Kozyrev made a spectrographic search at Crimea Observat Oct. 1956 based on the idea that any gas and even the rocky or dusty surface of the Moon must sh more luminescence than it would on Earth due to the exposure to the hard radiation of the S including corpuscular radiation. The work by Kozyrev on the rays near Aristarchus indica little or no lunar magnetic field. On Nov. 3, 1958 Kozyrev, observing Alphonsus under sim conditions as the author did on Oct. 26, 1956, reported observation of a half-hour discharge of from a craterlet atop Alphonsus. Luminescence caused by solar radiation produced the obser light and emission lines. His observations proved that internal forces also have been import in the evolution of lunar features, the meteoric hypothesis notwithstanding. The author belie that a discharge of gas must stir up some of the fine surface layer even if its thickness is less t one inch, leaving open the question whether the mantle of the Moon is still heated by interior co tions. Two of the Oct. 1956 photographs of the haze at the rill area of Alphonsus are reprodu *Subject Headings:* **1. Lunar craters 2. Lunar atmosphere.**—*O.T.* Ⓢ

12K–134 523

Alter, Dinsmore, **The crater Linné.** *Lunar and Planetary Exploration Colloquium, Proceed* 1(3):33–38, Oct. 29, **1958** (re-issued in bound vol. 1960). 4 plates. **DWB, DLC**—The histor observation of Linné by famous observers, beginning with Schroeter, in 1788, is presented. A s of recent photographs is included and discussed in connection with the problem of the presen lava, gas seepage and dust. It is believed that much more examination of the details of photogr is needed to avoid subjective conclusions. *Subject Headings:* **1. Lunar craters 2. Lunar vol processes.**—*O.T.*

12K–135 52

Alter, Dinsmore, **Scientific aspects of the lunar surface.** *Lunar and Planetary Explor Colloquium, Proceedings,* 1(1):3–10, May 13, **1958** (re-issued in bound vol., 1960). 22 plates. **DLC**—Twenty-one pictures of the Moon, some made at Lick Observatory and some made b author at Mount Wilson, are presented, explained and discussed. Inferences are drawn fro various formations observed, regarding the validity or fallacy of existing theories on the form of the lunar surface. *Subject Heading:* **1. Lunar topography.**—*O.T.*

12K–136 523.1

Amenitskiĭ, N. A.; Noskova, R. I. and Salomonovich, A. E. (*all, P. N. Lebedev Physical Acad. of Sci., U.S.S.R.*), **Radio image of the moon at 8 mm.** *Soviet Astronomy AJ,* New 4(1):177–178, July/Aug. **1960.** fig., 3 refs. **DLC.** Transl. of **Radioizobrazhenie Luny v 8- metrovom diapazone.** *Astronomicheskiĭ Zhurnal,* Moscow, 37(1):185–186, Jan./Feb. **1960.** D A report on the two-dimensional distribution of radio brightness of the moon in the 8-mm r obtained with the 22-meter radio telescope of the Physical Institute. A noticeable phase depen of the radio-brightness distribution, lagging the phase variation of the moon by ~30°, was n Limb darkening was also recorded. (*Same item as* 11.12–64, *Met. Abs.*) *Subject Heading:* **1. emission from Moon.**—*Authors' abstract.*

12K–137 523.34:5

Arnold, James R. (*Inst. Tech. Eng., Univ. Calif., La Jolla*), **Gamma ray spectroscopy Moon's surface.** *Lunar and Planetary Exploration Colloquium, Proceedings,* 1(3):28–31, Oc

1958 (re-issued in bound vol., 1960). **DWB, DLC**—Gamma ray spectroscopy can be used to investigate differentiation of the Moon's crust and radioactive elements. Potassium, uranium and thorium are probably present on the Moon in a ratio different from that on Earth. A multichannel analyzer could obtain information on the composition of these three elements. Some other applications of nuclear techniques are the detection of elements like aluminum, magnesium, silicon, manganese and sodium by X-ray fluorescent spectroscopy. Detection of iron is also discussed. *Subject Headings:* **1. Lunar surface 2. Lunar composition.**—*O.T.*

12K–138 523.34

Ashbrook, Joseph (*Harvard College Obs.*), **The lunar Straight Wall.** *Astronomical Society of the Pacific, San Francisco, Publications*, 72(424):55–58, Feb. **1960.** fig., table, 6 refs., eq. **DLC**—This note presents some quantitative information about the Straight-Wall in the western portion of Mare Nubium as an example of faulting on the Moon's surface. In 1957–59 observations were made of the vertical heights of seven points along the crust of the wall from the length of their sunrise shadows. These observed heights are presented in tabular and graphic form. The highest part of the Straight-Wall is about 360 m. From there the crust descends gently to south and north. The exposed face of the Straight-Wall has an average inclination to the horizontal of 41° which is an exceptionally steep slope for any large-scale lunar feature. *Subject Headings:* **1. Moon's surface 2. Lunar topography.**—*I.S.* Ⓢ

12K–139 523.32

Barabashov, N. P., **Novyĭ etap izucheniia Luny.** [A new phase in the study of the Moon.] *Akademiia Nauk SSSR, Vestnik*, 30(10):33–36, Oct. **1960.** fig. **DLC**—Recent investigations of physical conditions on the Moon are reviewed. According to the research of the author and others, the lunar surface appears to consist of grains of tuff having diameters of 1–3 mm. Radiometric investigations reveal temperature variations between +134°C and −153°C. Temperature derived from radio astronomical measurements (this includes underground temperatures) is between −73°C and −23°C. On a wavelength of 33 cm (originating well below the lunar surface), temperatures of −53±30°C were measured, practically unaffected by the phases. Radio measurements appear to indicate that the fractured or porous layer on the lunar surface is 10 cm deep. According to rocket and satellite measurements, the Moon has no observable magnetic field. Past investigations failed to demonstrate the presence of an atmosphere or of water. Photographs of the far side of the Moon and differences between the two sides are discussed. *Subject Headings:* **1. Moon 2. Lunar temperatures.**—*G.T.* Ⓢ

12K–140 523.164.83

Blevis, B. C. and Chapman, J. H., **Characteristics of the 488 megacycles per second radio signals reflected from the Moon.** *U. S. National Bureau of Standards, Journal of Research, Sec. D*, 64(4):331–334, July/Aug. **1960.** 4 figs., 4 refs. **DWB, DLC**—Radio signals at 488 Mc per second, received after reflection from the Moon, have been studied using a continuous wave bistatic radar system located near Ottawa, Canada. These experiments were carried out during 1957 and consisted of monitoring the signals received on two orthogonal dipoles mounted at the focus of a 28 foot parabolic tracing antenna. The total mean received signal yielded an effective radar cross section of the Moon at this frequency of 0.05 of the projected area. The libration fading as observed in the two orthogonal receiver channels was in synchronism, with a cross-correlation coefficient of 0.89. It was established that the signal is not depolarized significantly on reflection at the surface of the Moon or in passing through the ionosphere. Rotation of the plane of polarization of the radio wave in the double passage through the ionosphere was observed to change by nearly 180 degrees over a six-hour period during quiet ionospheric conditions. (*Same item as* 11.12–76, *Met. Abs.*) *Subject Heading:* **1. Radio echoes from Moon.**—*Authors' abstract.*

12K–141 523.35

Brandt, John C. (*Yerkes obs.*), **Density of the lunar atmosphere.** *Science*, Wash., D. C., 131(3413):1606, May 27, **1960.** 10 refs., 2 eqs. [**Comment by**] V. A. Firsoff and [**Reply by**] John C. Brandt, *Ibid.*, 131(3414):1669–1671, June 3, **1960.** refs., eq. **DLC** (Q1.S35)—The minimum possible density of the lunar atmosphere at the surface is shown to be essentially the value for the interplanetary medium. This value, when combined with the observed maximum, places the particle density between 10^3 and 10^6/cc, while the electron density must be about 10^3 to 10^4/cc. These results are markedly different from those recently obtained by FIRSOFF. FIRSOFF's comment consists of a fairly detailed discussion in his own defense and also a refutation of BRANDT's criticisms. FIRSOFF indicates that the problems which he and BRANDT are discussing are not the same. BRANDT's reply is that his position is unchanged, and he proceeds to discuss some theoretical details which he feels are relevant to the problem. *Subject Heading:* **1. Lunar atmosphere. I. Firsoff, V. A.**—*A.J.M. & author's abstract.* Ⓢ

12K–142 523.164

Brown, Walter E., Jr. (*Calif. Inst. Tech., Pasadena*), **A lunar and planetary echo theory.** *Jour of Geophysical Research*, Wash., D. C., 65(10):3087–3095, Oct. **1960.** 4 figs., table, 3 refs., 56 e **DLC**—The lunar radar echo is divided into specular and Lambert scatter components, the specu response is compared with experimental data from TREXLER, and the theoretical frequency respo is compared with some preliminary Goldstone moonbounce experimental data. The theory indica that the Lambert component will be visible at high power levels and would probably become parent about 1000μ sec after the leading edge of the echo. A value for reflectivity of 0.01 fou from the level of the scatter component is used to derive an estimate of some of the average propert of the lunar surface. (*Same item as* 11L–122, *Met. Abs.*) *Subject Headings:* **1. Radar echoes fr moon 2. Radio wave reflection from Moon.**—*Author's abstract.*

12K–143 523.

Fesenkov, V. G., **Fotometricheskie osobennosti Luny.** [Photometric peculiarities of the Moo *Astronomicheskiĭ Zhurnal*, Moscow, 37(3):496–500, May/June **1960.** 2 figs., 2 tables, 8 refs., 4 e Russian and English summaries p. 496. Transl. into English in *Soviet Astronomy AJ*, New Yo 4(3):468–472, **1960. DLC**—It is shown that all the fundamental properties of the Moon can accounted for by a rather simple formula, originally due to LOMMEL-SEELIGER. It includes o one function which is determined from observations, namely the relative brightness of the posit edge of the lunar crescent. A physical interpretation of the formula is possible only if it is assu that the surface layer of the Moon is a combination of comparatively large grains, very feebly bo together and capable of scattering light in a backward direction, partially shading each other. (*S item as* 11.12–179, *Met. Abs.*) *Subject Headings:* **1. Moon's surface 2. Lunar photometry.**—*Auth abstract.*

12K–144 52

†Gilvarry, J. J. (*Research Lab., Allis-Chalmers, Milwaukee*), **Origin and nature of lunar surf features.** *Nature*, London, 188(4754):886–891, Dec. 10, **1960.** 3 figs., 44 refs., 5 eqs. **DLC, D** Review by A. Güttler, **Entstehung und aufbau der Mondformationen.** [Origin and structur lunar formations.] In *Naturwissenschaftliche Rundschau*, Stuttgart, 14(5):192, May **1961.**— possibility is considered as to whether an atmosphere and hydrosphere on the Moon were formed exudation from the Moon's interior. It is shown that the origin and nature of the major sur features of the Moon can be explained in terms of effects of the former presence of a lunar hydrosph By making broad assumptions of analogy between certain terrestial and lunar features the au calculates that a lunar hydrosphere formed by a leakage through the surface of the moon from un lying regions existed for a period of 10^9 years. The dimensions of class I lunar craters have b studied to yield information on the distribution of hard and soft rocks to confirm that this tribution can be explained by the existence of a hydrosphere. The representative points of clas III and IV lunar craters are studied with a view to demonstrating that the upward progressio these points with ordinal class of the craters can be explained by the progressive change of circumstances in which the craters were formed initially, corresponding to the gradual loss of Moon's hydrosphere. *Subject Headings:* **1. History of the Moon 2. Lunar hydrosphere 3. L atmosphere.**—*R.B.* Ⓢ

12K–145 523.34:537.531:53

Goldberg, Edward D. (*Univ. Calif., La Jolla*), **X-ray techniques for probing the lunar surf** *Lunar and Planetary Exploration Colloquium, Proceedings*, 1(5):19–21, March 18, **1959** (re-issue bound vol., 1960). **DWB, DLC**—The use of a radioactive isotope for the X-ray source make X-ray diffraction apparatus the most attractive tool for mineral analysis in spite of the disadvan of having to send a radioactive source to the Moon. Preliminary studies with field apparatu various Earth surfaces are needed. The lower atomic numbered elements are easy to assay. the use of pulse-height analyzers semi-quantitative analyses of them are readily possible. energy X-rays are needed for diffraction and high-energy X-rays for fluorescence. The metho emission spectrometry would not carry with it the danger of radioactive contamination. *Su Headings:* **1. Moon's surface 2. Lunar composition.**—*O.T.* Ⓢ

12K–146 523

Green, Jack (*Calif. Res. Corp.*), **Geochemical implications of lunar degassing.** *Lunar Planetary Exploration Colloquium, Proceedings*, 1(4):1–18, Jan. 12, **1959** (re-issued in bound 1960). 20 figs., 5 tables, 43 refs. **DWB, DLC**—The analysis is based on the possible resul lunar degassing analogous to that of the earth. The possibility of calderas related to lunar cr is discussed. The mechanism of defluidization of the Moon's interior to create a technically favo environment in a relatively rigid and cool crust permitting escape of volatiles in calderas of col

is proposed. Observations on Earth and model studies of spheres under tension and compression are the bases for determining the process of caldera development. Features of calderas on Earth and Moon are compared, supposing that volcanism is the aftermath of degassing and caldera formation on a much smaller scale. Lunar valleys and mountain ranges of the moon are considered as of tectonic origin. Mineralization is possibly produced by lunar defluidization. Probably 95% of the non-mare area is volcanic. Volcanism is shown as a consequence of each degassing cycle and second in magnitude to defluidization. Degassing reached a maximum during early lunar history. In addition to the tables and illustrations, appendices on prominent lunar formations, on the development time sequence of the lunar tectonics, and a bibliography are included. *Subject Headings:* **1. Lunar composition 2. Lunar volcanic processes.**—*O.T.* Ⓢ

12K–147 523.34:534.32

Green, Jack, **Sonic velocity in possible lunar surface materials.** *Lunar and Planetary Exploration Colloquium, Proceedings*, 1(4):26–32, Jan. 12, **1959** (re-issued in bound vol., 1960). 7 figs., 10 refs. **DWB, DLC**—Mafic and silicic rocks were selected for terrestrial laboratory experiments, based on the concept of lunar degassing, to investigate the effect of temperature cycling, with and without vacuum, on sonic velocity. The instrumentation and technique to determine ultrasonic velocity are described. Water content, crystallinity and mineralogy appear to control sonic velocity changes produced by temperature cycling. Vacuum did not affect the velocity at any given temperatures. Signal amplitude and wave form were studied. Assuming defluidization as an operative process on the Moon for almost all surface features, then dust was produced during the accompanying volcanism in the non-mare areas. The maria, probably basaltic, are generally later than the non-mare areas. The dust thickness on the maria seems much less than on the non-mare areas. Sonic velocity is estimated. A comment by H. C. Urey indicates that temperature variations at the surface would not be of concern if sending seismic waves through the Moon. *Subject Headings:* **1. Lunar composition 2. Sound velocity in lunar surface.**—*O.T.* Ⓢ

12K–148 523.34

Green, Jack (*Aero-Space Labs, Missile Div. NAA*), **Comparison of lunar and terrestrial surface features.** *Lunar and Planetary Exploration Colloquium, Proceedings*, 1(5):2–3, March 18, **1959** (re-issued in bound vol., 1960). 2 figs., 4 refs. **DWB, DLC**—Author considers volcanism rather than impact processes as a more plausible mechanism for the creation of lunar craters. Comparison is made between "Serpentine Ridge" in Mare Serenitatis and a pressure ridge in the Sierra Negra Caldera, Galapagos Island and between the inundated lunar crater of the Straight Wall and a subsidence fault, southwest die of Darwin Caldera, Galapagos Island. *Subject Headings:* **1. Lunar topography 2. Lunar craters.**—*O.T.* Ⓢ

12K–149 523.34

Green, Jack (*Calif. Research Corp.*), **The physical characteristics of the lunar surface.** *Lunar and Planetary Exploration Colloquium, Proceedings*, 1(1):11–15, May 13, **1958** (re-issued in bound vol., 1960). **DWB, DLC**—The interpretation of the Moon's surface from the viewpoint of a geologist is conceived as that of a facsimile of the Earth's surface some 4 billion years ago. The physical features of the Moon reflect the opposite theories of their origin of which the degassing process is explained as super-volcanic activity whose effects were preserved by the absence of erosive agents. The transfer percentage of volatile elements in sea water and some features of crater morphology are presented in tables as documents to this process. The extensive discussion dealt with problems of phases and opposing theories on the evolution of the Moon; the observation of the surface features from a satellite; geophysical, and especially magnetic, measurements with examination of crater morphology; more accurate measurements of lunar altitudes; characteristics of lunar dust; temperature gradients, the dome theory, the composite origin of features; atmosphere; height of the mountains; mapping from a satellite; meteor impact; the problem of observable changes in general, and that of shrinkage. *Subject Heading:* **1. Moon's surface.**—*O.T.*

12K–150 523.74:523.35

Herring, J. R. and Licht, A. L. (*both, N. A. S. A., Wash., D. C.*), **The effect of solar wind on the lunar atmosphere.** *International Space Science Symposium, Nice, Jan.* 1960, Space Research: Proceedings of the First Symposium. Pub. **1960.** p. 1132–1145. 5 figs., 14 refs., 33 eqs. Russian summary p. 1132. **DWB** (523.1 161sp). Shorter version with same title in: *Science*, Wash., D. C., 130(3370):266, July 31, **1959.** 11 refs., 3 eqs. **DWB, DLC**—In this paper the properties of the solar wind during sunspot minimum are discussed. The effect of the solar wind on the lunar atmosphere is analyzed. Making certain assumptions, it is estimated that by collision of solar wind protons with the lunar surface, an atmosphere of cold neutral hydrogen is produced with a density of 10^5 cm^{-3} at the lunar surface. Based on these results an extended lunar ionosphere is deduced with a density

of the order of 400 protons cm^{-3} in the vicinity of the Moon. *Subject Headings:* **1. Lunar atmosph**
2. Solar wind effects on Moon.—*Authors' abstract.* Ⓢ

12K–151 523.164.83:52

Hughes, V. A. (*Royal Radar Estab., Malvern*), **Roughness of the Moon as a radar reflec**
Nature, London, 186(4728):873–874, June 11, **1960.** 8 refs. **DWB**—The echo is the result
scattering from a rough surface. The surface has vertical irregularities which are greater tha
wavelength and a horizontal scale which is considerably larger. To determine the order of magnit
for the roughness it was decided to measure more accurately the angular scattering properties
wave lengths of 10 cm, using the 2-MW radar transmitter in the 45 ft diameter radio telescope a
pulse length of 5μsec corresponding to a range resolution of 0.75 km. The mean of 31 runs sho
very close fit to an exponential law over a range of angles from about 3° to at least 14°. We can
that over representative areas of 8000 km^2, the slope would appear to have a random distribution
a root mean square value of about 1 in 20. (*Same item as* 11.12–77, *Met. Abs.*) *Subject Headi*
1. Moon's surface 2. Radar echoes from Moon 3. Malvern, Eng.—*E.Z.S.*

12K–152 551.510.5:551.506.7:551.507.362 52

†Jastrow, Robert (*Goddard Space Flight Center, NASA*), **Lunar and terrestrial atmosphe**
Advances in the Astronautical Sciences, N. Y., Vol. 5, 1959, issued **1960.** p. 338–345. 6 figs., 22 r
eq. **DWB** (629.1388 A512pro), **DLC** (QB1.A26)—The composition and extent of the lunar
mosphere are discussed in relation to such factors as solar wind and gravitational forces. I
on the Earth's atmosphere obtained from rockets and satellites, especially temperature and den
data, are compared and correlated, and such effects as latitude, solar flares, solar radiation, coll
of trapped particles, and the role of Van Allen belts are considered. Two models of the atmosp
are postulated on the basis of both rocket and satellite data. *Subject Headings:* **1. Atmosph**
models 2. Lunar atmosphere.—*Author's abstract.* Ⓢ

12K–153 523.34:62

Jastrow, Robert, **Exploration of the Moon.** *Scientific American*, N. Y., 202(5):61–69,
1960. 7 photos. **DWB, DLC**—The Moon as the Earth's nearest neighbor is considered as
most favorable object of space exploration. Cosmic dust has rained upon its surface for eon
impeded by any atmosphere thus serving as a biographical record of the solar system. Explor
of its temperature history will help to settle uncertainties about the origin of the Sun and the pla
The preservation of irregularities of the Moon's shape shows that its interior has been quite col
mechanically quite strong. Among the tens of thousands of craters on the Moon only a
resemble terrestrial volcanoes and as GILBERT pointed out in 1892, meteorite fragments cr
them. The seas are probably flows of lava which welled up through fissures in the surface d
periods of internal activity. The 1957 telescopic picture of the Moon revealed a rather poi
surface probably created by hopping of electrically charged solar protons as suggested by G
experiments. Among possible means of lunar space exploration are suggested an instrument des
to penetrate the surface and reveal its hardness; a gamma-ray spectrometer mounted in a
satellite or a landing capsule to investigate rocks of the lunar crust; a landed seismometer to s
information on the internal structure of the Moon; and X-ray fluorescence spectrograph to dete
the chemical composition of the lunar surface; a gravimeter to furnish measurements of the vis
and elasticity of the Moon's interior and, finally, a roving vehicle to land on the Moon's surfac
be piloted about by remote control to correct the possibly misleading impressions gained fro
limited number of sites at which earlier instruments will have landed. Excellent photog
illustrate the Moon's surface entirely as well as some of its characteristic details. *Subject Hea*
1. Moon's surface 2. Lunar exploration.—*O.T.* Ⓢ

12K–154

Kaverin, A. A., **Klassifikatsiia lunnykh zatmenii.** [Classification of lunar eclipses.] *Vs*
znoe Astronomo-Geodezicheskoe Obshchestvo, Biulleten', No. 27(34):27–31, **1960.** table, 5 refs.,
DLC—Many different methods for investigation of the atmosphere were developed on the ba
data obtained during lunar eclipses. In view of the special interest in eclipses, an Astron
Yearbook has been published in the U.S.S.R. since 1958 with many data on dark and se
eclipses and on their classification (partial and total). The criteria for the classification are d
from the angularity of shadow and semi-shadow related to the equatorial horizontal para
and radii of Moon and Sun. These criteria are mathematically formulated and discussed
text with numerical examples. *Subject Heading:* **1. Lunar eclipses.**—*N.P.S.* Ⓢ

12K–155 523.164.34:

Leadabrand, R. L.; Dyce, R. B.; Fredriksen, A. et al. (*all, Stanford Res. Inst., Menlo*
Calif.), **Evidence that moon is a rough scatterer at radio frequencies.** *Journal of Geophysi*

search, Wash., D. C., 65(10):3071–3078, Oct. 1960. 10 figs., table, 7 refs., eqs. **DLC**—Radar echoes from the Moon have been observed at 400 Mc/s for the purpose of determining the scattering properties of the Moon. The results go beyond the investigations of other authors who claim that the Moon is a quasi-smooth reflector having a range depth of less than 600μsec. Results described in this report indicate that, although the moon behaves as a quasi-smooth reflector in the 0- to 600-μsec range depth, beyond this range the moon behaves as a uniformly rough scatterer, giving echoes out to 1 lunar radius or the limit of visibility of the Moon's surface from the earth. An empirical fit to the integrated range versus time display provides an angular scattering law for each infinitesimal area of the surface given by: $P(\phi) \propto [(\sin\theta)/\theta]^{20\pm6} + 1/10$. A procedure for mapping the details of the Moon's surface by radar, using range and Doppler shift coordinates is suggested. This technique does not require angular resolution. (*Same item as* 11L–125, *Met. Abs.*) *Subject Headings:* **1. Radar echoes from Moon 2. Moon's surface. I. Presnel, R. I. II. Schlobohm, J. C.**—*Authors' abstract.*

12K–156 523.3(02)

†Markov, Aleksandr Vladimirovich (*ed.*), **Luna.** [The Moon.] Moscow, Gos. Izdat. Fiziko-Matematicheskoĭ Literatury, **1960.** 384 p. 110 figs., 32 tables, numerous refs. at end of each ch., 61 eqs. 2 charts in pocket. **DLC** (QB581.M3)—This volume is a thorough compendium of knowledge and literature on the Moon and its properties. Each of the 9 chapters was contributed by different authors, all outstanding in their special fields. The multiple authorship led to overlapping treatment in several areas but this lack of complete coordination is compensated for by the competent presentation of the material within each chapter. The first three chapters deal with the Moon's motion, shape and surface. In Ch. 4, N. N. SYTINSKAIA takes up the problem of the lunar atmosphere on the basis of theoretical considerations, observations of stellar occultations, spectroscopic studies, polarimetry and radioastronomy. She concludes that the vicinity of the Moon is not different physically from the rest of interplanetary space and that gases may appear only temporarily in one or the other part of the Moon's surface, due to meteorite impact or volcanic activity. Ch. 5 contains 3 sections: 1) **Albedo and color of the Moon's surface,** by N. P. Barabashov; 2) **Polarization of light at the Moon's surface,** by A. V. Markov; and 3) **Lunar surface temperature,** by M. S. Zel'tser. Ch. 6–8 take up, in turn, radio methods in lunar research; the lunar topography and its development; and the role of cosmic factors in the evolution of the Moon. The final chapter, by V. V. SHARONOV, is a detailed review of knowledge and hypotheses concerning the structure and composition of the surface of the Moon. Throughout the book there is a generous amount of observational data, theoretical deductions, and photographic material. *Subject Headings:* **1. Moon 2. Lunar compendia 3. Lunar bibliographies I. Sytinskaia, N. N. II. Barabashov, N. P. III. Zel'tser, M. S. IV. Sharonov, V. V.**—*G.T.* Ⓢ

12K–157 523.323.6

Mil'khiker, M. A., **Nabliudeniia chastnogo lunnogo zatmeniia 24 marta 1959 g.** [Observations of the partial lunar eclipse of March 24, 1959.] *Vsesoiuznoe Astronomo-Geodezicheskoe Obshchestvo, Biulleten'*, No. 27(34):32–36, **1960.** 3 figs., table, 3 refs. **DLC**—Observations of maximum phase of the lunar eclipse made at Chernovitzy at 1 h 43 m 48 s, are described in detail and with characteristics of the optical instruments. All successive variations in the shadows and intensities of color were observed and recorded with photographic cameras, telescopes, and photometers. The integral intensities in observed variations of shadows, shapes and color are tabulated and illustrated on charts. *Subject Headings:* **1. Lunar eclipse observations 2. Color of Moon 3. Brightness of Moon.**—*N.P.S.* Ⓢ

12K–158 523.341:551.21

†Moore, Patrick, **Problems of the Moon.** *Advancement of Science*, London, 17(65):33–41, May **1960.** photos., 58 refs. **DLC**—Some of the trends in observational selenography are outlined. Arguments concerning the observations of an outbreak inside the crater Alphonsus (*see* 12K–114, this biblio.) and the case of Linné on the Mare Serenitatis are reviewed, leading to the conclusion that major changes do not occur on the lunar surface. It is, however, uncertain whether the surface is changeless or whether minor activity still occurs. Other problems to be solved are: how the maria and craters were produced; the precise nature of the surface layer; the existence or non-existence of a general lunar atmosphere. *Subject Headings:* **1. Moon's surface 2. Lunar volcanic processes 3. Volcanic eruptions on Moon.**—*E.K.* Ⓢ

12K–159 523.35:537.56

Öpik, E. J. and Singer, S. F. (*both, Physics Dept., U. of Maryland*), **Escape of gases from the Moon.** *Journal of Geophysical Research*, Wash., D. C., 65(10):3065–3070, Oct. **1960.** 4 tables, 2 refs., 12 eqs. **DLC**—Contrary to expectations from the classical theory of an exosphere, we find that even the heaviest gases, for example the noble gases krypton and xenon, cannot be retained by

the Moon. Because of the ionizing effects of solar ultraviolet radiation, electric forces now beco
more important than gravitational forces. First we consider thermal escape from a thick atmosph
with a hot top, and then from a thin atmosphere accommodated to the temperature of the surfa
but still not an exosphere. We calculate also the rate of escape of photoelectrons and deduce
escape rate of ions. The lifetime of an atmosphere containing all the krypton and xenon believe
have evolved since the origin of the moon is of the order of 800 and 50 years, respectively. A
the atmosphere has thinned to less than a mean-free path (i.e., an exosphere), yet another mechan
of escape of heavy gases exists. It seems likely that the Moon as a whole is positively charged
potential of about +20 volts, owing to the great intensity of solar ultraviolet radiation. He
in the vicinity of the Moon there will exist a strong electrostatic field. Whenever a krypton
xenon atom is ionized while it is in flight within the screening length near the moon the ion will
expelled by the electrostatic field. The lifetime turns out to be about 1000 years and is somew
increased by the effect of solar corpuscular streams. Hence it is concluded that there is not m
likelihood that light or heavy gases evolving from the Moon will be retained by the Moon.
only gas in the vicinity of the Moon can come from interplanetary space itself. (*Same item*
12.4–104, *Met. Abs.*) *Subject Headings:* **1. Lunar atmosphere 2. Ionization of gases exosphere**
Authors' abstract.

12K–160 52

Press, Frank (*Seis. Lab. Calif. Inst. Tech.*), **The geological aspects of the interior of the M**
Lunar and Planetary Exploration Colloqium, Proceedings, 1(1):15–18, May 13, **1958** (re-issue
bound vol., 1960). **DWB, DLC**—Techniques for exploring the Moon's and the Earth's inte
are compared. Shape, density and pressure of the Moon are compared with our knowledge o
crust, density and core of the Earth gained from seismological observations and computations
from observations of gravity variations. Information on compensation of mountains as relate
inelasticity is obtainable by measurements of the variations of the value of gravity on the M
A single recording seismograph on the Moon would disclose whether the Moon is cold or has
generated by radioactivity and it would determine how quiescent the Moon is. Measurements
magnetic field would determine the existence of a fluid core. The difficulties of observations fr
moving platform are enumerated. Seismic investigations to delineate the Moon's crust an
interior are discussed as well as telemetering seismic observations on atomic explosions. Obta
geological information without landing on the Moon, the problem of eliminating noise and m
seismic effects, the measuring of tides, two hypotheses for the formation of the moon and finally
problem of organic origin of hydrocarbons are also discussed. *Subject Headings:* **1. Moon's int**
2. Seismic soundings on Moon 3. Lunar exploration.—*O.T.*

12K–161 550.34

Press, Frank (*Seismological Lab.*); Buwalda, Phyllis and Neugebauer, Marcia (*both, Calif.*
Tech., Pasadena), **A lunar seismic experiment.** *Journal of Geophysical Research*, Wash., D
65(10):3097–3105, Oct. **1960.** 5 figs., 3 tables, 12 refs., 9 eqs. **DLC**—A feasibility study show
a lunar seismic experiment can provide significant data on the structure and composition of the M
The presence or absence of lunar seismicity is an important clue to current tectonic processes
affect the lunar surface. In the first generation of experiments, single detectors are envisaged
the capability of recording body and surface waves. Investigation of proposed methods of
seismogram interpretations indicates that these detectors should be sufficient to give a rough o
of lunar seismic geography and to indicate crudely the composition of the Moon as well as its
structural features. In the absence of lunar seismicity, the best statistics on the frequency o
teorite impacts indicate that meteorites may provide useful auxiliary seismic sources. In rea
this conclusion, reasonable estimates were made of the efficiency of impact as well as of seismic
attenuation. Critical factors in the experiment are instrument lifetime and sensitivity an
nature of lunar microseismic noise. (*Same item as* 12.4–103, *Met. Abs.*) *Subject Headings:* **1.**
2. Seismic soundings on moon 3. Lunar seismicity.—*Authors' abstract.*

12K–162

Ruggieri, Guido, **L'emisfero invisibile della luna.** [Hidden hemisphere of the Moon.] *C*
Bologna, 28(1/2):1–6, Jan./Feb. **1960.** fig., plate. **Pt. 2,** *Ibid.*, 28(3/4):33–40, March/Apri
Pt. 3, *Ibid.*, 28(5/6):70–73, May/June **1960. DLC**—After an appreciation of the importance of
III's pictures of the hidden part of the Moon, the main features of the photographs are describ
a sketch map of the Moon's far side is presented. Some of the problems awaiting clarificati
analysis and future exploration of the Moon's far side, are indicated. Meanwhile a sketch
orography of the Moon is made. In the light of the new findings, existing theories concern
nature and origin of lunar surface features are reviewed in detail. *Subject Headings:* **1. Far**
Moon 2. Lunar photographs 3. Lunar maps 4. Soviet satellite 1959 Theta (Lunik III).—

12K–163 523.22:523.3

Ruskol, E. L. (*Earth Physics Inst. Acad. Sci., U.S.S.R.*), **O proiskhozhdenii Luny 1. Obrazovanie okolozemnogo roia tel.** [The origin of the Moon, Pt. 1, Formation of a swarm of bodies around the Earth.] *Astronomicheskiĭ Zhurnal*, Moscow, 37(4):690–702, July/Aug. **1960.** fig., 18 refs., 20 eqs. English summary p. 690. **DLC.** Transl. in *Soviet Astronomy AJ*, New York, 4(4):657–668, Jan./Feb. **1961. DLC**—The basic hypotheses on the origin of the Moon are discussed in detail, interest centering on the work of V. V. Radzievskiĭ and E. P. Razbitnaia, which are based on modern concepts of the accumulation of planets and satellites from smaller solid bodies. These authors considered the restricted three-body problem (Sun, Moon, small particle) and assumed that the capture by the Earth of particles leading to the formation of a satellite was due to an increase in the Earth's mass and the resultant expansion of the zero-velocity surfaces. It is shown that this capture mechanism is ineffective for the formation of a moonlike body. Another capture mechanism is considered: inelastic collisions between particles and bodies in the vicinity of the growing Earth. It is shown that a swarm of bodies of total mass 0.01–0.1 m_{δ} could have formed about the Earth during its growth period. This would require the "effective" dimension of the colliding particles to be not more than 10–100 km, for the average probability of capture in a single collision to be of the order of 0.01. The size of the swarm would be about 100 Earth radii, with the density of the matter strongly concentrated toward the Earth. The rotation of such swarms would have to take place in the same direction as the rotation of the protoplanetary cloud. The possibility of utilizing this collisional model in the study of the origin of other satellite systems and in the study of the Trojans is noted. *Subject Heading:* **1. Origin of Moon.**—*Author's abstract.* Ⓢ

12K–164 523.3

Salisbury, John W., **Introduction to the Moon.** *U. S. Air Force. Air Research and Development Command, TN* 60-456, July **1960.** 30 p. 7 photos, 6 refs. USAF Lunar reference mosaic folded and tipped in at end (in color).—An account is given of various theories of the origin of the Moon. The composition and structure of the Moon and its surface are described. Problems relating to the lunar atmosphere, temperature and surface materials are discussed. An account is given of satellite experiments conducted to explore the Moon. *Subject Headings:* **1. Moon 2. Lunar exploration.**—*A.H.K.* Ⓢ

12K–165 523.3

Sharonov, V. V., **Luna i ee priroda.** [The Moon and its nature.] *Priroda*, Moscow, No. 1:9–19, Jan. **1960.** 2 figs. **DLC**—In this paper the author reviews and outlines the existing information about the Moon, its topography, the origin of its mountains, the Moon's atmosphere, the luminescence of its rocky formations, the coloration of the Moon's landscape, the temperature prevailing there at different times and on different parts of the Moon's surface, and the structure of the Moon's surface. All new facts established by science during the last few years are discussed. (*Same item as* 11.10–98, *Met. Abs.*) *Subject Heading:* **1. Moon.**—*A.M.P.*

12K–166 523.32:523.036.51

Stevenson, Jack A. and Grafton, John C. (*both, North American Aviation, Inc., Columbus, Ohio*), **Lunar temperature environment.** *Institute of Environmental Sciences, Proceedings, Los Angeles, Calif., April* 1960, pub. **1960.** p. 233–242. 16 figs., table, 4 refs., eqs. **DWB** (606 I59pro)—An attempt is made to determine the temperature of an object on the Moon in radiant interchange with a solar shield and the lunar surface; the effect of shield height and surface finish, and the consequence of a change in emissivity and absorptivity. Calculation procedure for radiant heat transfer, lunar surface temperature variation, temperature distribution in a lunar ravine, flat phase temperatures, heat rejection rates for a shielded object on the lunar surface with and without internal heat load, an unshielded object with internal heat load, heat rejection from an underground installation, storage of propellants on the moon, and underground cryogenic storage are dealt with and illustrated by diagrams. Designing equipment for lunar temperature environment requires an integrated team effort by specialists on heat transfer, temperature control systems, computer programming, material properties and structural design. *Subject Heading:* **1. Lunar temperatures.**—*O.T.* Ⓢ

12K–167 523.34:523.035.313

Teĭfel', V. G. (*Astrobotany Sector, Acad. Sci., Kazakh S.S.R.*), **Spektropoliarimetriia nekotorykh uchastkov lunnoĭ poverkhnosti.** [Spectropolarimetry of some regions of the lunar surface.] *Astronomicheskiĭ Zhurnal*, Moscow, 37(4):703–708, July/Aug. **1960.** 2 figs., 4 tables, 13 refs., 6 eqs. English summary p. 703. **DLC.** Transl. in *Soviet Astronomy AJ*, New York, 4(4):669 673, Jan./Feb. **1961. DLC**—Spectropolarimetric observations of the Moon at near quadrature have revealed that the degree of polarization of lunar features falls off with wave length in the spectral interval 400 to 620 mμ, by an average of 0.04–0.06. The variation of polarization with wave length is determined chiefly by the dependence of polarization of the monochromatic albedo values of lunar

formations, which is similar to the dependence of polarization on albedo in white light. But t polarization values obtained from observations over different intervals of the spectrum give so indication of being affected by the luminescence of lunar rocks. *Subject Headings:* **1. Moon's surfa 2. Polarization of light from Moon 3. Albedo of Moon.**—*Author's abstract.* Ⓢ

12K–168 523.34:629.

Tombaugh, Clyde (*Dept. Astron., New Mexico Coll. of Agric. and Mechanic Art*), **Where to la on the Moon.** *Lunar and Planetary Exploration Colloquium, Proceedings*, 1(3):15–19, Oct. 29, 19 (re-issued in bound vol., 1960). **DWB, DLC**—A landing site is proposed at the center of a cir with a 200 mi diameter near Aristoteles, which includes several features it would be of interest explore. Some analogies and differences between the Moon and Mars are elaborated on. hypothetical explanations of the main features of the Moon and their origin, derived from t comparison, are discussed, showing agreement mainly with the geologist's point of view, but so disagreement with the viewpoint of other scientists. *Subject Headings:* **1. Lunar explorat 2. Lunar landing 3. Astronautics.**—*O.T.*

12K–169 52.

Urey, H. C. (*Univ. Calif., La Jolla, Calif.*), **Lines of evidence in regard to the composition of Moon.** *International Space Science Symposium, Nice, Jan.* 1960, *Space Research: Proceedings of First Symposium.* Pub. **1960.** p. 1114–1122. 2 tables, 10 refs. Russian summary p. 1 **DWB** (523.1 I61sp)—There are two principal lines of evidence with regard to the composition of Moon. The first rests upon the problem of the density of the Moon, which is low, compared v the terrestrial planets. Making reasonable assumptions one finds that the density at ordin pressures and temperatures may be somewhere in the neighborhood of 3.4. This is distinctly lo than that of the chondritic meteorites which have been fairly well investigated. Calculation sh that the probable abundance of total iron in the Moon lies somewhere in the neighborhood of 1 11 percent as compared with 22 and 28 percent for two groups of chondrites. This indicates the Moon has more nearly the solar composition as indicated by recent astronomical studies, also that the composition agrees better with current theories for nucleogenesis than does the c position of the meteorites. *Subject Headings:* **1. Moon 2. Moon's composition.**—*Author's st stract.* Ⓢ

12K–170 52

Urey, H. C. (*Inst. Tech. Eng. Univ. Calif., La Jolla*), **The chemistry of the Moon.** *Lunar Planetary Exploration Colloquium, Proceedings*, 1(3):1–9, Oct. 29, **1958** (re-issued in bound **1960**). 4 plates. **DWB, DLC**—The chemistry of the Moon is approached from the study of sev pictures showing the characteristic mare and crater forms. Impressed by GILBERT'S theory th meteoric impact is responsible for the circular shape of Mare Imbrium and the craters surroundi the arguments for a meteoric theory of origin as opposed to a volcanic theory are elaborated, gi credit to GILBERT'S explanation (1893). It is shown by selected pictures of parts of the Mo surface that dust of iron-nickel, the chief substance of meteors, is a probable explanation for shades prevailing on the Moon's surface. The morphological forms, as distinct from those o Earth, are due to the difference of internal heat affecting the different rigidities of the crust. presence of radiation, however, is still in need of more satisfactory analysis. *Subject Hea* **1. Moon's surface.**—*O.T.*

12K–171 5

Urey, H. C., **The origin and nature of the Moon.** *Endeavour*, London, 19(74):87–99, April 5 photos, 10 refs. **DLC**—Present theories are discussed and inferences concerning lunar struc are derived from photographs of the far side of the Moon. A meteoric, the so-called Imb collision seems most responsible for the Moon's surface. The pictures of the other hemisphe the Moon did not yield any very important conclusion about the structure and history of the M The possibility of measuring radioactivity of the Moon, placing seismographs on the Moon's su or securing samples of lunar material opens up a new phase of lunar research in which astron will be joined by a number of other scientists. (*Same item as* 11.12–176, *Met. Abs.*) *Subject H ings:* **1. Moon 2. Lunar exploration.**—*O.T.* Ⓢ

12K–172 5

Vestine, E. H. (*Rand Corp.*), **Evolution and nature of the lunar atmosphere.** *Lunar Planetary Exploration Colloquium, Proceedings*, 1(1):19–23, May 13, **1958** (re-issued in bound 1960). table, plate. **DWB, DLC**—The evolution of the lunar atmosphere is unknown but a Moon's origin is probably similar to that of the Earth, the source of its tenuous atmosphere v also be similar to that of the Earth. A review of the theories on the formation of the Moon, th of escape of lunar gases, radiation from the surface, possible temperature gradients, gaseous res

above the surface, the relation of the temperatures and possible gases and their vapor pressures, the effect of the solar corona and of a lunar magnetic field on the maintenance of an atmosphere and of various chemical combinations points to the probability of a feeble atmosphere having the density of the terrestrial F region with no specific indication of its chemical nature, argon being its most probable constituent. Other than local source of gases is negligible. Refrigeration of gases on the dark side of the Moon results in a feeble but rapid circulation of the atmosphere. The solid accumulation of gases may prove beneficial to explorers. Surface temperatures vary widely. The surface molecular structure is probably simple due to its long exposure to solar radiation of short wave length. *Subject Heading:* **1. Lunar atmosphere.**—*O.T.*

12K–173 551.507.362.2:523.39

von Bülow, Kurd, **Die Rückseite des Mondes.** [The far side of the Moon.] *Scientia*, Milan, 95(578):181–187, June **1960.** 3 plates. **DWB, DLC**—Photographs of the far side of the Moon taken by Lunik III are analyzed in comparison with the corresponding aspects of the front side. There appear to exist a few actual "seas" and a certain number of depressions, which are considered as "epicontinental seas"; the number of lunar "craters" is very great. Most of the clear spaces on the photos, which indicate the "lands" ("firm lands") is covered by them. On the far photographed side of the Moon, the surfaces covered by seas is relatively smaller than on the front side. There is, however, about 28% of the far side (14% of the sphere's surface) which is not yet known and it is thus still impossible to draw definitive conclusions. A belt of depressions seems to continue on the far side the belt of seas of the front side. The Soviet Mounts should be considered as the border of a zone of soils obliquely raising and more or less comparable to the Apennines, of the front side. From the tectonic point of view, one can, up to now, only suppose the existence of North-South elements. The differences between both sides (back and front) are differences in degree and not differences in nature. The author thinks that because of the uncertainty in any attempt at interpretation, it is premature to venture any hypothesis or theory. At the very most, the scantiness of large seas and the relatively important number of "crater-seas" can be asserted. *Subject Headings:* **1. Moon's surface 2. Far side of Moon 3. Lunar photographs 4. Lunar topography 5. Soviet satellite 1959 Theta (Lunik III).**—*A.V.* Ⓢ

1961

12K–174 523.3:576.8

†Anders, Edward (*Prof. of Chemistry, Univ. of Chicago*), **The moon as a collector of biological material.** *Science*, Wash., D. C., 133(3459):1115–1116, April **14, 1961.** 12 foot-refs., 2 eqs. **DLC**—Several authors have discussed the possibility that the Moon might serve as a repository for microorganisms or "astroplankton" from outside the solar system. In considering the quantitative aspects of this idea, the mass of microorganisms which needs to be ejected from an average planet in the galaxy to give the minimum detectable density of one microorganism per square meter of lunar surface, or 10^{-12} g/m^2 must be determined and the processes of capture and ejection mechanisms must be considered. It is concluded that the deposition of 3.8×10^{13} extra-solar-system microorganisms is virtually impossible. *Subject Heading:* **1. Life on Moon.**—*K.C.* Ⓢ

12K–175 523.36

Bartha, L., **Probleme des Mondmagnetismus.** [Problems of lunar magnetism.] *Die Sterne*, Leipzig, 37(1/2):22–24, Jan./Feb. **1961.** fig., 8 refs. **DLC**—The incandescent inner portion of the terrestrial globe is responsible for more than 9/10 of the Earth's magnetic field; the Moon, probably completely cooled, does not possess an incandescent inner matter and hence it is inferred that the Moon has no significant magnetic field. However, the Moon's surface is composed of volcanic rocks (basalt, granite, trachyte, etc.) and therefore it might present a certain magnetism impossible to observe at present. This lunar magnetism can however be ascertained by means of geophysics. The article mentions the findings of Z. Berkes (Budapest) in 1953 and gives a survey of the investigations covering two five-year periods (1939, 41, 42, 44, 45 and 1950–54) which were carried out by the author and from which the conclusion can be drawn that the Moon might have a weak magnetic field. *Subject Heading:* **1. Lunar magnetic field.**—*A.V.* Ⓢ

12K–176 523.164.34

Coates, Robert J. (*N. A. S. A., Wash., D. C.*), **Lunar brightness variations with phase at 4.3 mm wave length.** *Astrophysical Journal*, Chicago, 133(2):723–725, March **1961.** 5 figs., 3 refs. **DWB, DLC**—Observations of lunar radiation were started at the Naval Research Laboratory at a wave length of 4.3 mm. The radio telescope used has been described in detail in a previous publication (Coates, 1958). The antenna is a parabolic reflector 10 ft in diameter, and it has a beam width of 6.7 min. of arc at the wave length of 4.3 mm. The receiver was a Dicke-type radiometer. The records of two scans for the lunar phase of 340° are shown. An hour angle scan for the phase of 77°

is also shown. Repeated hour angle scans for lunar mapping were made across the lunar disk nine different declination positions. The curves for each declination position were used to m contour maps of observed antenna temperature. First-order corrections for the antenna patt were then applied to obtain maps of lunar brightness. A figure shows a lunar map and photogr made for the phase of 77°. Examination of the lunar maps produced suggest that, in general, at level of 4.3 mm emission, the maria heat up more rapidly and also cool off more rapidly than mountain regions. Mare Imbrium appears to be an exception to this, remaining cooler than surrounding throughout the lunar cycle. Since it is apparent that the different regions on the m have different characteristics at millimeter wave lengths, it is important that the previous meas ments at longer wave lengths be repeated with higher resolution, in order to separate the charac istics of the different regions. *Subject Headings:* **1. Lunar brightness variations 2. Radio emiss from Moon.**—*E.Z.S.* Ⓢ

12K–177 523.164.83:52

†Daniels, Fred B. (*U. S. Army Signal Res. & Dev. Lab., Fort Monmouth, N. J.*), **A theor radar reflection from the Moon and planets.** *Journal of Geophysical Research*, Wash., D. C., 66 1781–1788, June **1961.** 6 figs., 18 refs., 22 eqs. **DLC**—Huygen's principle is used to derive relat between the surface statistics of a randomly irregular celestial radar target and the angular po spectrum and autocorrelation function of the reflected signal. The spatial correlation functio the signal observed by spaced receivers is also computed. From observed lunar signal fading a crude pictorial representation of the small-scale structure of the Moon's surface is constru The angular power spectrum is derived from the autocorrelation function of the signal fading, the result is compared with the angular distribution measured directly by means of the pulse-d technique. *Subject Headings:* **1. Radar echoes from Moon 2. Moon's surface.**—*Author's abstra*

12K–178 523.39:551.507.3

The far side of the moon. *Discovery*, London, 22(6):242–245, June **1961.** 5 figs., table map of the far side of the moon together with some of the Lunik III photographs are reprod from the Russian **Atlas of the far side of the Moon** (*see* 12K–131, this biblio.). In addition f seven prominent features are listed by name and descriptions of them as they appear in the Luni photographs are given. Of the forty-seven, seventeen are new discoveries. The others are i region of the Moon visible from the earth. *Subject Headings:* **1. Far side of Moon 2. Lunar p graphs 3. Lunar maps 4. Soviet satellite 1959 Theta (Lunik III).**—*R.B.* Ⓢ

12K–179 52

Firsoff, V. A., **Selenological studies, Pt. 1.** *British Astronomical Association, London, Jou* 71(4):149–151, April **1961.** 4 refs., 6 plates. **DWB, DLC** (QB.B75)—A method of sphe projection has been developed to overcome the difficulties in studying the limb regions of the M due to foreshortening. A selection of projection photographs is reproduced here together some line charts drawn from them. The detailed structure of the Moon's surface in the vicini the South Pole and the Leibnitze Mountains is discussed. *Subject Heading:* **1. Lunar topogr** —*R.B.* Ⓢ

12K–180 523.323.6:5

Gibson, J. E. (*U. S. Naval Res. Lab.*), **Lunar surface characteristics indicated by the M 1960 eclipse and other observations.** *Astrophysical Journal*, Chicago, 133(3):1072–1080, May 2 figs., 21 refs. **DWB, DLC**—The variation in lunar brightness temperature during the total e of March 13, 1960, was found to be about 1° or less at 8.6-mm wave length. This result, combined with prior data for this and other wave lengths, indicates that the average, or ty lunar surface structure is stratified in at least two, and possible three, layers. The topmost la about 0.5 cm in depth and seems to resemble ordinary sand *in vacuo*, the intermediate layer m several centimeters or more in depth and is mot notably characterized by a high electric conduct while the lowermost stratum of indefinite depth is more like rock. *Subject Headings:* **1. Brigh of Moon 2. Moon's surface 3. Lunar eclipse observations.**—*Author's abstract.* Ⓢ

12K–181 523.164.42:523

Hazard, C. (*Univ. of Manchester, Nuffield Radio Astron. Lab., Jodrell Bank*), **Lunar occul of a radio source.** *Nature*, London, 191(4783):58, July 1, **1961.** 6 refs. **DWB**—Attent directed to the high precision with which source positions can be measured by observing occultations with equipment which can track the Moon continuously. The results of a prelim test of the technique on a radio source are described. The observations were carried out by reco the output of the receiver with the telescope in automatic motion following the center of the M The occultation was observed as a sharp fall in the receiver power as the source was covered

Moon, followed later by a sharp rise as the source reappeared. *Subject Headings:* **1. Radio star occultation 2. Lunar occultation.**—*R.B.* Ⓢ

12K–182 523.3:629.19

Jastrow, R. (*Inst. of Space Studies, Goddard Space Flight Center, U. S. N. A. S. A.*), **American plans for exploring the Moon with instruments.** *New Scientist*, London, 10(240):702–705, June 22, **1961.** 7 figs. **DLC, DWB**—Study of the Moon should yield considerable information on the history of the solar system. Its shape, structure and topography have remained relatively undisturbed for a long period of time. In addition the layer of cosmic dust on its surface should give important clues to the chemical history of the solar system. The lunar science program begins with the delivery of simple instruments to measure features of the surface structure, surface radioactivity and level of seismic activity within the lunar interior. TV reconnaissance will follow and in five to eight years time it may be possible to return samples of lunar matter from the moon by remote control. The details of the instrumentation of the Ranger satellite which will carry the first instruments to the Moon is described and some speculation is made of the design of future vehicles and their possible instrumentation. *Subject Headings:* **1. Lunar exploration 2. Space research.**—*R.B.* Ⓢ

12K–183 523.36

Kopal, Zdenek, **Water on the Moon?** *Discovery*, London, 22(4):143–146, April **1961.** 2 photos. **DLC**—It is probable that the planets and other solid bodies of the solar system have grown by an accumulation of smaller pre-existent particles and dust in the solid state, at moderate temperatures. Such particles, similar to present day meteorites, must contain a certain proportion of water probably in the form of crystals. The present temperature of the interior of the Moon would cause such water to become steam which would escape towards the surface. As the surface is sub-freezing this would freeze below the surface and subsurface glaciers would form. The so-called lunar "domes" may by visual evidence for such phenomena. The possibility of hot geysers bursting through the lunar surface needs to be further investigated. *Subject Headings:* **1. Lunar domes 2. Lunar hydrosphere.**—*R.B.* Ⓢ

12K–184 523.32

Levin, B. Iu. and Maeva, S. V., **Some calculations of the thermal history of the Moon.** *Soviet Physics: Doklady*, N. Y., 5(4):643–646, Jan./Feb. **1961.** fig., 6 refs. **DWB.** Trans. of **Nekotorye raschety termícheskoĭ istorii Luny,** *Akademiia Nauk SSSR, Doklady*, 133(1):44–47, July **1960. DLC**—The calculations were carried out on the basis of a model picturing the evolution of the Moon through an accumulation of cold solids. The initial temperature distribution was determined on the assumption that the central portions began accumulating radiogenic heat before the peripheral portions. The calculations were carried out with a hydrointegrator of V. S. Luk'ianov's design in the Central Scientific Institute of Construction. Calculations of the heating up of the Moon, a qualitative picture of the processes during melting, and calculations of the cooling of the Moon are presented. The temperature distribution at present depends mainly on the content of radioactive elements, and assuming their content as maximum, the Moon is solid to a depth not less than 500–700 km. A diagram shows the quick cooling of external layers and the heated and partially melted lower parts of the mantle. *Subject Headings:* **1. Lunar temperatures 2. History of the Moon 3. Moon's interior.**—*O.T.* Ⓢ

12K–185 523.39

Lipskiĭ, Iu. N. (*Shternberg State Astron. Inst.*), **Photography of the reverse side of the Moon—techniques and preliminary results.** *Soviet Astronomy AJ*, New York, 4(6):976–989, May/June **1961.** 6 figs., map, 5 refs., eq. **DLC.** Transl. of **Metody izucheniia fotografiĭ obratnoĭ storony Luny i nekotorye pri etom rezul'taty,** *Astronomicheskiĭ Zhurnal*, Moscow, 37(6):1043–1052, Nov./Dec. **1960. DLC**—The method used for studying the photographs of the reverse side of the moon is described. The photographs were taken by means of an automatic circumlunar station on Oct. 7, 1959. Some of the results obtained are given. *Subject Headings:* **1. Far side of Moon 2. Lunar photographs.**—*Author's abstract.* Ⓢ

12K–186 523.39

Lipskiĭ, Iu. N., **Pervye fotografii obratnoĭ storony Luny.** [The first photographs of the far side of the Moon.] *Priroda*, Moscow, No. 1:35–40, Jan. **1961.** photos., 3 figs., folded map, ref. **DLC**—The back of the Moon was photographed by an Automatic Interplanetary Station on Oct. 7, 1959 at 03:30 o'clock from a distance of 65,200 km from the center of the Moon. It was photographed at a phase angle of 17°, that is, close to full moon (with reference to the Automatic Interplanetary Station). The line of the terminator was visible from the station only on the northern hemisphere. During the photographing the station was in such a position that a large part of the invisible lunar surface and a considerable section along the western edge of the visible lunar disk could be photographed. A camera with two objectives having a focal length and relating opening

of 200 m and 1:5.6 and 500 m and 1:9.5, respectively, was used. The negative structures on t film were transformed into electrical signals. The scanning of the film by a light beam from electron ray tube, the transformation of the negative into electrical signals, and the construction a map of the back surface of the Moon are described. It was found that the two lunar hemisphe are not symmetrical. The opposite side of the Moon does not possess such depths and depressio as the Ocean of Storms (Ocean Procellarum), the Sea of Rains, the Sea of Serenity and such surfa as the Sea of Crises. The formations on the opposite side of the Moon do not differ in their charac and structure from those on the visible side. There are a large number of craters on the oppos side, some of which are shown on the photographs. The system of light rays characteristic of visible lunar surface exist also on the back of the moon; the crater Giordano Bruno as a center of li rays is similar to the craters of Copernicus and Kepler. Also mountainous structures exist. coefficients of reflection of the structures on the back of the Moon indicate that they possess reflect properties similar to the areas situated between the craters of Jacobi and Sacroboseo. A map of back of the Moon, photographs of the back of the Moon, etc., are presented. *Subject Headin* **1. Lunar photographs 2. Lunar maps 3. Far side of Moon.**—*I.L.D.* Ⓢ

12K–187 523

MacDonald, Gordon J. F. (*N. A. S. A. Goddard Space Flight Center, Greenbelt, Md.*), **Inte of the Moon.** *Science*, Wash., D. C., 133(3458):1045–1050, April 7, **1961.** 7 figs., table, 13 re 4 eqs. **DLC**—The author discusses in detail the following: astronomical data concerned with mean density of the Moon; thermal state of the Moon as related to the distribution of radioactiv temperature and thermal conductivity; dynamic history of the Moon and, finally, observatio determinations of the nature of the Moon's interior. *Subject Heading:* **1. Moon's interior.**—*K.*

12K–188 523.34:523.035.

†Minnaert, M. (*Utrecht Obs.*), **Photometry of the Moon.** (In: Kuiper, G. P. and Middlehu B. M. (*eds.*), **Planets and satellites.** Chicago, Univ. of Chic. Press, **1961.** p. 213–248. 12 fi 2 tables, 130 refs.) **DWB, DLC**—Detailed and integrated photometry are defined. Problem integrated photometry of the Moon are surveyed and methods of detailed lunar photometry their results are presented. The analysis of the photometric function deals with lunar formati comparison with theoretical models and with terrestrial materials. The normal albedo is exam in relation to lunar formations and terrestrial materials. The colors of lunar formations are vestigated. The method of lunar photometry as an aid to topography and the possible fluoresce of the lunar surface are suggested. *Subject Headings:* **1. Lunar photometry 2. Color of M 3. Albedo of Moon 4. Moon's surface.**—*O.T.* Ⓢ

12K–189 52

Öpik, Ernst J. (*Univ. of Md.*; on leave from *Armagh Obs., Northern Ireland*), **Tidal deformat and the origin of the Moon.** *Astronomical Journal*, New Haven, Conn., 66(2):60–67, March 1 5 tables, 12 refs., 45 eqs. **DLC**—Results of a provisional survey of the ellipticities of lunar crate selected areas of Kuiper's **Atlas** are discussed. The rms random ellipticity is found to be 0.070 the center, 0.096 near the limb, and is probably due to oblique impact. Small preferential c ponents of ellipticity are indicated and interpreted as possible after-effects of past tidal deformat Formulas for tidal-rotational deformations of line elements of an elastic nonresisting surface are gi The smallness of the preferential effects is in itself significant, without regard to their absolute v They suggest that the craters were formed when the Earth-Moon distance was of the order of 30, 50,000 km. The undamaged appearance of the craters except for impact erosion and flooding, the absence of signs of major crustal deformations indicates that since crater formation the m could not have been at a closer distance. From theoretical rates of accretion as based on probabil of interplanetary collisions, possible modes of origin of the Moon are discussed. If the pre- craters mark the end of a continuous process of accretion which built the Moon, the observed s systematic deformations of the craters are only compatible with the Moon having accreted fr cloud of fragments circling the Earth in direct orbits at a distance of five to eight Earth rad greater. The assumption of different processes for accretion of the Moon and for the form of pre-mare craters leads to improbable consequences. Only when the preferential ellipticitie discounted as due to other causes or to chance, is it possible to accept the alternative of the M having accreted from interplanetary material orbiting the Sun. Accretion must then have simultaneously with tidal evolution following initial tidal capture, the pre-mare craters h formed at a distance of over 200,000 km from earth as the final stage of this accretion. *Su Headings:* **1. Origin of Moon 2. Tidal deformations 3. Lunar topography.**—*Author's abstract.*

12K–190 523.36 538.3:5

Olte, A. and Siegel, K. M. (*both, Univ. Michigan Radiation Lab.*), **Distinction betwee electromagnetic constants of tektites and Libyan Desert glass and their effect on lunar su**

heory. *Astrophysical Journal*, Chicago, 133(2):706–717, March 1961. 4 figs., 5 tables, 10 refs., 53 eqs. **DWB, DLC**—The electromagnetic constants of tektites and Libyan Desert glass have been obtained in the laboratory, and it has been found that, for all tektites measured, the relative permittivities of tektities vary between 6 and 7.4, while the relative permittivity of Libyan Desert glass is 4.2. Thus it seems clear that Libyan Desert glass is not a tektite. Lunar radar scattering theory indicates that the material found in the scattering centers of the moon is significantly different from tektites as found on earth. *Subject Headings:* **1. Tektites 2. Lunar composition.**—*Authors' abstract.* Ⓢ

12K–191 523.346:523.035.336

Radlova, L. N., **Color of the bright rays on the lunar surface.** *Soviet Astronomy AJ*, New York, 4(6):990–992, May/June 1961. 2 tables, ref., eq. **DLC.** Transl. of **K voprosu o tsvete luchei na lunnoĭ poverkhnosti,** *Astronomicheskiĭ Zhurnal*, Moscow, 37(6):1053–1055, Nov./Dec. 1960. **DLC**—The color distribution along some bright rays, belonging to the systems of the craters, Tycho, Copernicus and Kepler, is studied by methods of visual and photographic colorimetry. For some rays a very insignificant variation of color along the ray is found. However, the detected differences in color are within the limits of errors of measurements and therefore it can be adopted that in the mean the layer of the bright rays is of the same color as the surrounding background of the lunar surface. *Subject Headings:* **1. Moon's surface 2. Color of Moon 3. Colorimetry.**—*Author's abstract.* Ⓢ

12K–192 523.34

†Salisbury, John W. (*AF Cambridge Res. Lab., Bedford, Mass.*), **The origin of lunar domes.** *Astrophysical Journal*, Chicago, 134(1):126–129, July 1961. 3 figs., 11 refs. **DWB, DLC**—Three previously suggested hypotheses of origin for lunar domes are reviewed, and a new hypothesis of origin is suggested. The three previously suggested hypotheses include volcanic, gas-bubble, and laccolithic origins for lunar domes. The newly suggested hypothesis of origin is a mineral-phase-change expansion hypothesis. It is demonstrated that serpentinization of olivine below 500°C involves approximately a 25 percent increase in volume, which would be more than adequate to produce domical structures. *Subject Heading:* **1. Lunar domes.**—*Author's abstract.* Ⓢ

12K–193 523.346:551.21:546.264

Urey, Harold C. (*Univ., Calif., La Jolla, Calif.*), **On possible parent substances for the C_2 molecules observed in the Alphonsus crater.** *Astrophysical Journal*, Chicago, 134(1):268–269, July 1961. ref. **DWB, DLC**—The compounds coming from the lunar interior which would supply the C_2 molecules observed by Kozyrev (*see* 12K–114, this biblio.) are reviewed. It has been concluded that carbonaceous compounds may be present in the Moon's surface, such as observed in the carbonaceous chondritic meteorites. These would be partially volatilized by high temperatures and might supply gaseous carbon compounds containing two or more atoms of carbon, as well as water, carbon dioxide, and other compounds. *Subject Headings:* **1. Lunar composition 2. Carbon dioxide in Moon 3. Lunar interior 4. Volcanic eruptions on Moon.**—*E.K.* Ⓢ

12K–194 551.507.362.2:523.39

von Bülow, Kurd, **Korrekturen am Bilde der Mondrückseite.** [Corrections on the picture of the far side of the Moon.] *Forschungen und Fortschritte*, Berlin, 35(8):225–228, Aug. 1961. chart. **DLC**—The Academy of Science of the U.S.S.R. issued in December 1960 its **Atlas of the far side of the Moon.** (*See* 12K–131, this biblio.) An analysis of this publication leads to the conclusion that the photos taken by Lunik III on Oct. 7, 1959 and published at that time need, in some respects, to be reappraised. A re-evaluation of the pictures proves that the difference between the two sides are merely qualitative rather than essential. To obtain a full knowledge of the far side of the Moon and to get answers to hitherto unsolved problems, photos are needed which show the yet totally unknown half of the far side of the Moon. *Subject Headings:* **1. Far side of Moon 2. Lunar photographs.**—*E.K.* Ⓢ

SUPPLEMENTARY MATERIAL

12K–195 523.34:629.19 523.3.061

†Green, J., **Geophysics as applied to lunar exploration.** North American Aviation, Inc., Contract AF 19(604)-5886, Missile Division Report 59-277, Final Report, June 30, 1960. 268 p. 90 figs., 22 tables, bibliog., p. 234–254, numerous eqs.—A survey of the recent geophysical literature as applied to lunar exploration. Experiments and surveys are discussed and described for use in hovering, surface, and subsurface probes. For the hovering and surface surveys, certain mor-

phological features of impacted and volcanic terrains were described. Comparison curves of g physical instruments over craters of the two opposing mechanisms of origin are compared. two-curve magnetometer offers much in terrain analysis of the lunar surface. Instrumenta details of television and infrared surveying are detailed. The dry-hole resistivity, neutron-neut density, and pulsed accelerator logs are described and endorsed. The pulsed accelerator neut gamma system is particularly suited for analysis of elements of high-neutron capture cross sec such as boron, chlorine, and sulfur. Nuclear spectroscopy of the neutron-gamma reaction typ amenable to volume analysis in distinction to surface analysis techniques and can provide an dication of the nature of the material in fissures and under dust. Ice may be detected by technique. Four instrumented vehicles, two hovering and two soft-landed, are described for performance of specific missions. The equipment common to all four vehicles includes televi and infrared cameras and electronics, shift registers, encoders, analog-to-digital converters, gramers, command receivers and decoders, power supplies, telemeters, and wiring and struct In addition to this common unit, the ATLAS hovering contains a gamma ray scintillometer, and t curve magnetometer; the SATURN hovering contains the ATLAS instruments plus a gravime a mass spectrometer and a radar altimeter. Both surface vehicles contain a landing control gramer, instrumentation programer, radioactive and sonic shielding, and electromagnetic dev for extender probes. The surface ATLAS vehicle also contains a micrometeorite detector, criminated gamma log, neutron-neutron log, resistivity log, temperature log, nested geoph magnetometer, and density log. The SATURN surface vehicle contains all the ATLAS instrum except the neutron-neutron log. In addition, the SATURN contains a pulser to accompany geophone, proton-gamma and neutron-gamma accelerator log, mass spectrometer, drilling lubricant, and batteries for drilling. The sites for location of these vehicles are detailed on a l map on which are specified geological and geophysical features of interest. *Subject Head* **1. Lunar exploration 2. Lunar landing 3. Astronautics 4. Lunar bibliographies.**—*From au abstract.* Ⓢ

12K–196 523

Warner, Brian, **Rilles near the lunar crater Plato.** *British Astronomical Association, Jou* 70(7):299–300, Sept. **1960.** fig., 3 refs. **DWB**—The chart in this paper has been constructed observations made from 1956 to 1960; four observations with a 7-in reflector, one with a 12 reflector, and two with an 18-in refractor. The chart shows eighteen broad, shallow valleys, of which are on the ruined formation immediately south of Plato. The characteristics of the rills are noted. *Subject Headings:* **1. Lunar topography 2. Lunar craters.**—*K.C.* Ⓢ

12K–197 52

Goodman, N. J., **Some lunar sketches made by D. W. G. Arthur at the Yerkes Observa** *British Astronomical Association, Journal*, 70(7):301–304, Sept. **1960.** 7 figs. **DLC**—In this p a set of seven lunar line-drawings are reproduced from twenty-three supplied by D. W. G. Art They show various forms of rills with particular attention to the association of rills with other formations. *Subject Heading:* **1. Lunar topography. I. Arthur, D. W. G.**—*K.C.* Ⓢ

12K–198 523.47 52

Porter, William S. (*Bucknell Univ., Lewisburg, Pa.*), **Constitutions of Uranus and Nept** *Astronomical Journal*, New Haven, Conn., 66(5):243–245, June **1961.** 6 tables, 6 refs., 5 eqs. —The internal constitutions of Uranus and Neptune have been investigated on the basis o assumption that solid ammonium is a major constituent of these planets. An equation of found by Bernal and Massey for this substance has been employed together with the equati hydrostatic equilibrium to find the internal density and mass distributions. The presence o determined, more dense materials has been allowed for in a phenomenological manner and i been found that the ammonium contents are 84 and 74% for Uranus and Neptune, respect Both planets appear to have dense cores of heavy material of approximately twice the mass o earth. *Subject Headings:* **1. Uranus 2. Neptune 3. Planetary composition 4. Ammoniu planets.**—*Author's abstract.* Ⓢ

12K–199 5

Dollfus, Audouin, **Nouvelle recherche d'une atmosphère au voisinage de la Lune.** research on the atmosphere in the vicinity of the Moon.] *Académie des Sciences, Paris, Co Rendus*, 234(21):2046–2049, May 19, **1952.** 4 refs. **DLC**—An account is given of new res concerning the thin lunar atmosphere. The observations were carried out with a coronograp a fringe polariscope. The polarized corpuscular light diffused above the horns of the crescen studied. The feeble polarization of the background luminescence was compensated and an aux polarization increased the accuracy. The density of the lunar atmosphere has been found to

thousand millionth of that of the Earth: a value ten times feebler than the one obtained by photometry in 1949. *Subject Headings:* **1. Lunar atmosphere 2. Brightness of Moon.**—*E.K.*

12K–200 523.32.523.164.34

†Baldwin, J. E. (*Mullard Radio Astron. Obs., Cavendish Lab., Cambridge*), **Thermal radiation from the Moon and the heat flow through the lunar surface.** *Royal Astronomical Society, London, Monthly Notices*, 122(6):513–522, **1961.** 2 figs., 6 tables, 26 refs., eqs. **DLC**—Observations of thermal radiation from the Moon at a frequency of 178 Mc/s are described, giving a value for the mean disk temperature of 253±8°K, which is the same to within 25°K as various estimates of the mean disk temperature at the surface. The absence of any detectable steady temperature gradient through the surface leads to upper limits on the steady heat flow from the Moon for a range of possible properties of the surface materials. The observations at shorter radio wavelengths favour a model in which a gravelly material extends to depths of at least several meters. For this model the upper limit to the heat flow is very close to that expected from radioactive decay in a Moon of chondritic composition. *Subject Headings:* **1. Thermal radiation of Moon 2. Lunar temperatures 3. Radio emission from Moon.**—*Author's abstract.* Ⓢ

12K–201 523.36:550.378:523.165

*Barton, John A. (*Boeing Airplane Co., Seattle*), **An estimate of the nuclear radiation at the lunar surface.** *Advances in the Astronautical Sciences*, N. Y., 6:794–804, **1961.** 2 figs., 7 tables, 16 refs. **DLC, DWB** (629.1388 A512pro)—In order to provide suggestions for lunar probe instrumentation, as basis for the interpretation of lunar probe data, and a preliminary guide for lunar manned exploration and lunar base design, an estimate of the lunar surface radiation has been made. Consideration has been given to the various sources of radiation including decay of radioactive elements in the lunar crust, activation of lunar crust by primary cosmic and solar radiation, and direct cosmic and solar radiation. Plausible assumptions have been made concerning the composition of the lunar crust and the particle and energy spectra of the incident radiation. The effect of several possible magnetic values has been included. Based on the results obtained for the lunar surface radiation, the biological dosages have been determined for the various sources. It is concluded that the biological dosages from lunar crust activation are small compared to the direct radiation and that the direct-radiation dose is greatly enhanced during periods of solar activity. Measurements are suggested which might test the validity of the results or to establish an upper limit for the lunar surface radiation. *Subject Headings:* **1. Radioactivity of Moon 2. Cosmic radiation on Moon.**—*Author's abstract.* Ⓢ

12K–202 523.35/6:016

†Evans, George R. (*comp.*), **Lunar atmosphere and surface conditions: an annotated bibliography.** *Lockheed Aircraft Corp. Missiles and Space Div., Sunnyvale, Calif., Special Bibliography SB-61-22*, May **1961.** 27 p. 63 refs. At head of t-p.: LMSD 3-10-61-1. At head of each page: 5-10-61-2/SB61-22.—The primary concern of this compilation was to collect information on the theory of the atmosphere and surface of the moon; also, emphasis was placed on data derived from experiments and investigations. This compilation and a companion one (lunar probes and landings) were undertaken to support studies of an eventual lunar landing. There are 63 separate items in this bibliography dating from Jan. 1959 to the present. Abstracts range from one sentence to a paragraph. A corporate author index is given at the end of the abstracts section. Except for a few items, only papers in English have been included, and a major part of the material is research reports by U. S. government or government-sponsored agencies. *Subject Headings:* **1. Lunar atmospheres 2. Lunar bibliographies 3. Moon's surface.**—*Author's abstract & A.J.M.* Ⓢ

12K–203 523.35

Singer, S. F. (*Dept. of Physics, Univ. Maryland*), **Atmosphere near the Moon.** *Astronautica Acta* Vienna, 7(2/3):135–140, **1961.** 3 tables, 14 refs., 3 eqs. German, English and French summaries p. 135–136. **DWB**—Any reasonably anticipated steady evolution of gas from the Moon is insufficient for the formation of an atmosphere. Contrary to expectations from the classical theory of an exosphere, we find that even the heaviest gases, for example the noble gases krypton and xenon, cannot be retained by the Moon. Because of the ionizing effects of solar ultraviolet radiation, electric forces now become more important than gravitational forces. The lifetime of an atmosphere containing all the krypton and xenon believed to have evolved since the origin of the Moon is of the order of 800 and 50 years, respectively. After the atmosphere has thinned to less than a mean-free path (i.e., an exosphere), yet another mechanism of escape of heavy gases exists. It seems likely that the Moon as a whole is positively charged to a potential of about +20 volts, owing to the great intensity of solar ultraviolet radiation. Hence, in the vicinity of the Moon there will exist a strong electrostatic field. Whenever a krypton or xenon atom is ionized while it is in flight within the

screening length near the Moon, the ion will be expelled by the electrostatic field. The lifet turns out to be ~1000 years and is somewhat increased by the effect of solar corpuscular strea Hence we conclude that there is not much likelihood that light or heavy gases evolving from Moon will be retained by the Moon. The only gas in the vicinity of the Moon can come from in planetary space itself. Accreted, accommodated and reemitted solar coronal gas yields an ave permanent density of about 80 hydrogen atoms per cm^3; this density may rise to about 10^5 per following solar eruptions. *Subject Heading:* **1. Lunar atmosphere.**—*Author's abstract.* Ⓢ

12K–204 523.45:62

*Straly, Warren H. and Voss, Robert G. (*both, Army Ballistic Missile Agency, Huntsville, A*
Requirements for the exploration of Jupiter and its moons. *Advances in the Astronautical Scie*
N. Y., 6:833–870, **1961.** 20 figs., 9 tables, 8 refs., 25 eqs. **DLC, DWB** (629.1388 A512pro)—
paper has as its purpose the establishment of basic requirements necessary for the exploration of
planet Jupiter and its moons. Jupiter, by virtue of being the largest of our planets in mass and
due to its central position in the solar system, is of great interest to the scientific community.
find this planet some 400 million miles away in space; its mass amounts to more than 300 Ea
while its volume exceeds that of our planet by more than a thousand-fold. Past observations o
great planet, and its satellites have made major contributions to astronomical knowledge. In
light of this knowledge it is very desirable that a probe or other exploration of the Jovian syste
made as soon as practicable. This paper is concerned largely with the compilation of knowl
made available from studies of physical phenomena concerning Jupiter, and the application of
knowledge to the areas of space-flight mechanics and space system design. These two broad a
serve to form a basis for the investigation of the requirements necessary for exploration. Comm
cations and data transmission, guidance and control, auxiliary power sources, and flight environ
are examined in the light of energy requirements, trajectories, orbital navigation, large tra
times, vehicle capabilities, mission objectives, and payload characteristics. Consideration is
given to the time element incident to any thought on the exploration of Jupiter. It would obvi
be very inefficient, and perhaps economically impracticable, to spend a very long time sendi
payload to Jupiter which was only capable of short-time operation in the vicinity of its objec
This is, of course, related to the mission objective and vehicle capabilities but deserves sp
emphasis because it is the key to the establishment of feasibility. *Subject Headings:* **1. Plan**
exploration 2. Jupiter.—*Authors' abstract.* Ⓢ

12K–205 523.35/6

†U. S. Geological Survey. Military Geology Branch, **Bibliography of the Moon.** Wash., D
July **1960.** 170 p. **DLC** (Z5154.M7U6)—This bibliography contains over 2,000 referenc
papers published in the international literature on the physical nature and properties of the M
Papers on the movement of the Moon or its effect upon the Earth were not included. The refer
are listed alphabetically by author without annotation or indexes. *Subject Headings:* **1. I**
2. Lunar bibliographies.—*G.T.* Ⓢ

12K–206 523.35:54

†Watson, Kenneth; Murray, Bruce C. and Brown, Harrison (*all, Div. of Geological Sci*
Calif. Inst. of Tech.), **Behavior of volatiles on the lunar surface.** *Journal of Geophysical Res*
Wash., D. C., 66(9):3033–3045, Sept. **1961.** 4 figs., 3 tables, 33 refs., 20 eqs. **DLC**—Volatiles
water in particular, have been thought to be unstable on the lunar surface because of the
removal of constituents of the lunar atmosphere by solar radiation, solar wind, and gravita
escape. The limiting factor in removal of a volatile from the Moon, however, is actually the eva
tion rate of the solid phase, which will be collected at the coldest points on the lunar surface.
present a detailed theory of the behavior of volatiles on the lunar surface based on solid-
kinetic relationships, and show that water is far more stable there than the noble gases or
possible constituents of the lunar atmosphere. Numerical calculations indicate the amount of
lost from the Moon since the present surface conditions were initiated is only a few grams per
the lunar surface. The amount of ice eventually detected in lunar 'cold traps' thus will pro
sensitive indication of the degree of chemical differentiation of the Moon. *Subject Headings:* **1.**
atmosphere 2. Water on Moon.—*Authors' abstract.* Ⓢ

PART III. RECENT TRANSLATIONS AND ANALYTICS FROM SERIALS AND COLLECTED WORKS

Note: Material listed in these sections will not be included in the monthly indexes until abstracted.

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